MAY 1954

PRECISION METAL MOLDING

INCLUDING DIE CASTINGS MAGAZINE

DIE CASTINGS
INVESTMENT CASTINGS
POWDER METALLURGY
PERMANENT MOLD CASTINGS
PLASTER MOLD CASTINGS
SHELL MOLDINGS

PMM

DESIGN • MANUFACTURE • FINISHING • USE

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Aluminum ALLOYS

Zamak ZINC BASE DIE CASTING ALLOYS

Whatever aluminum or zinc alloy you use, you're always assured of trouble-free production and quality castings. Quality of metal is always uniform; rigid metallurgical control and latest testing devices assure that every pound meets your specifications. Each order, large or small, receives prompt individual attention. Each order is palletized for easy handling and is shipped with a certified chemical analysis.

For complete information and prompt service on your requirements, contact the sales office in your area.

Send for your copy of bulletin showing composition and physical properties of aluminum and zinc alloys.

Aluminum Smelting & Refining Co., Inc.

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TELEPHONE: CLEVELAND MOntrose 2-3100

INDIANAPOLIS, INDIANA
215 CIRCLE TOWER • PHONE: MArket 4000

DETROIT, MICHIGAN
P. O. BOX 4014 • PHONE: VErmont 7-9962

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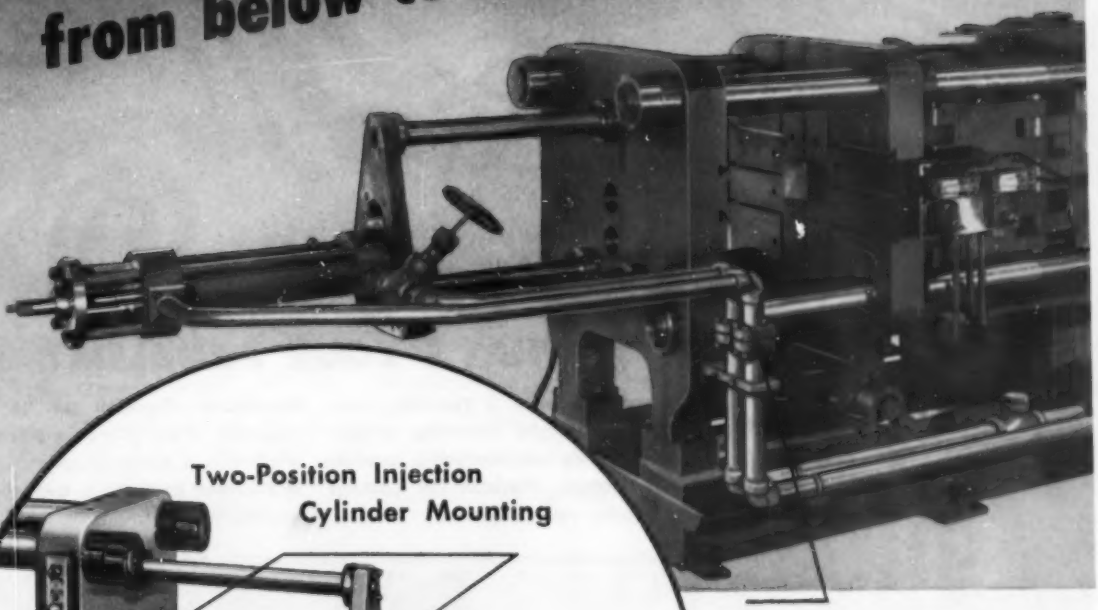
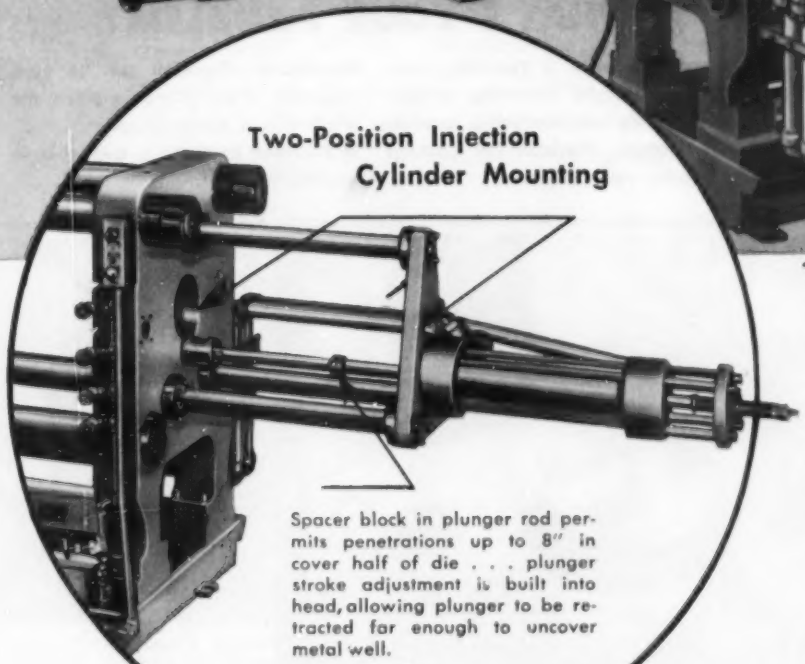
Another CAST-MASTER BONUS feature

FAST, EFFICIENT CHANGE-OVER from below center to center shot!



Two-Position Injection Cylinder Mounting



Spacer block in plunger rod permits penetrations up to 8" in cover half of die . . . plunger stroke adjustment is built into head, allowing plunger to be retracted far enough to uncover metal well.

When changing from below center to center shot, simple addition of extra section of pipe eliminates the use of hose or flexible tubing, thereby affording an extra measure of safety.

In modern production, time means money. That's why leading die casters praise the exclusive features shown here, which permit rapid change-over without sacrificing safety. To learn about other Cast-Master "bonus" features, send for the new, complete catalog giving illustrations and specifications on eight great new models.

SEND FOR CATALOG!

CAST-MASTER Inc. 2123 HAMILTON AVE. CLEVELAND 14, OHIO

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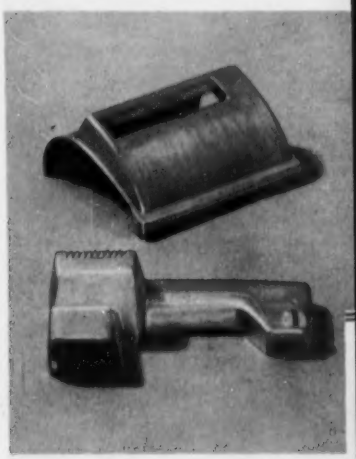
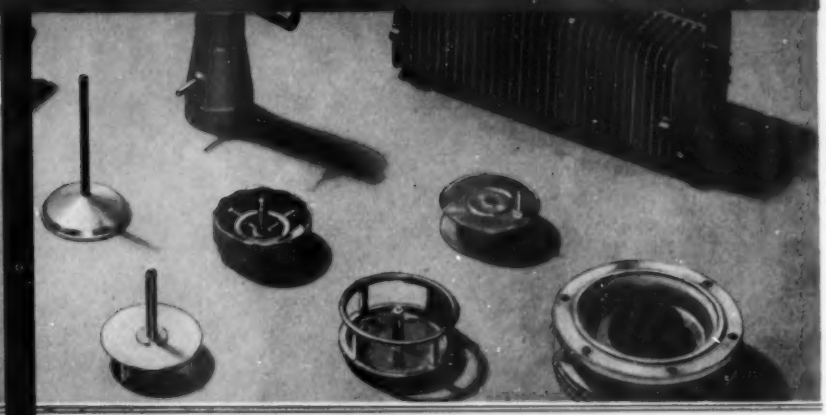
No Problem's Too Tough

when you call in ... PRECISION





WHAT'S YOUR PROBLEM?

If your problem is reducing costs, reducing weight, improving product appearance or improving product performance, Precision Die Castings can solve your problems.

Remember — Precision can be most valuable when called in when the product is in design stage.
A Precision Engineer is available to you NOW!

Since 1909 the name "PRECISION" has been the symbol of highest quality in the die casting industry.

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MAY 1954
Vol. 12 No. 5

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PRECISION METAL MOLDING

DIE CASTINGS • INVESTMENT CASTINGS • PLASTER MOLD CASTINGS
PERMANENT MOLD CASTINGS • POWDER METALLURGY • SHELL MOLDINGS

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. . . and when it comes to producing complex die cast parts we have that valuable experience

As a matter of fact, if you were to call on us at our plant, you would be impressed with the wide variety of zinc and aluminum die castings we are producing.

We have made big die castings, but can save money for you on the little ones as well.

We make complex castings to meet your specs, and give the same careful attention to simple castings.

We'll gladly advise you on your problems.

Send for your free copy of this helpful manual, "Dimensioning Die Castings."

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Letters to the editor

BONDING STEEL & ALUMINUM

We would appreciate receiving any available information on methods and producers, concerning the Bonding of Aluminum to Cast Iron and Steel. — J. O. (Metallurgist)

Source of detailed information on the Al-Fin process, described beginning on page 49 of this issue, has been forwarded. This war-born technique shows great promise for increasing the useful applications of aluminum die castings, and permanent mold castings by supplementing the weight advantage of aluminum with the hardness advantage of steel. — Ed.

PERMANENT MOLD

We are anxious to receive information on manufacturers of permanent molding machines and equipment. We also would like to find out about any companies which specialize in producing molds for that process. If you have any information which might be of assistance to us, we would certainly appreciate your help. R. N. F. (Assistant to General Manager)

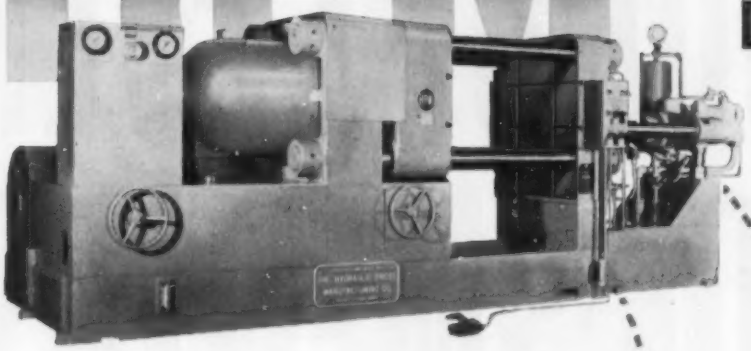
One company is known to us to specialize in the manufacture of permanent mold casting machinery, and several die makers have wide experience in producing permanent molds. Names have been forwarded. — Ed.

SHORT RUN CASTINGS

The current issue of your interesting and useful magazine contains an article on "Short or Long Run?" in which reference is made to casting in rubber molds.

continued on page 8

HPM

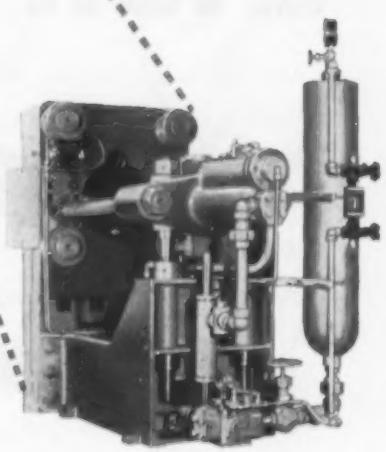


Model 400-B *Aluminum* Die Caster!

with Built-In Nitrogen Accumulator for INCREASED INJECTION SPEED!

for ALL-HYDRAULIC HIGH PRODUCTION of PRECISION PARTS . . .

- Here's a new, high-speed die casting machine for making aluminum castings up to 12 lbs. in weight. Listed below are just a few of the H-P-M design features which make this new die caster second to none:
- High-speed plunger advance . . . up to 400 ft. per minute.
- Positive, injection pressure build-up . . . no pre-fill valve to close.
- Built-in hydraulic ejector saves time, greatly reduces die costs and minimizes operator fatigue.
- Rugged straight-line "All-Hydraulic" die clamp with few moving parts, assure positive die alignment . . . die change-over is simple and fast.
- Dual hydro-electric safety devices guard against premature injection.
- Plenty of space around die mounting surfaces for installation of core pull cylinders.
- Independent handwheel adjustments for both die clamp and injection pressures.



400 ft. per Minute *Injection Speed*

Write for catalog 5106-A, today.

SPECIFICATIONS MODEL 400-B					
SIZE OF DIE PLATES	SPACE BETWEEN BARS	DIE OPENS	MAXIMUM DIE SPACE	CAPACITY PER SHOT (LBS.)	NET WT. (LBS.)
38"x38"	23"x23"	16"	42"	2.2 To 12.2 (Al)*	40,500

*Note: The model 400-B handles brass and magnesium die casting as well. Complete specifications on this and model 150-A (150-Ton) machines on request.

HPM

THE HYDRAULIC PRESS MFG. CO.

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Presses For Every Pressure Processing Application

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Aluminum smelters are good businessmen!

NO FOUNDRY EVER LACK OF SMELTERS

Aluminum smelters are your insurance of a constant and dependable source of supply.

Why? Because 80% of their business is furnishing aluminum casting ingot for foundrymen and die casters, and it is only good common sense to watch over the interests of the customers who provide you with 80% of your business. The smelters develop the alloys you need, they deliver on time—all the time. Their technical specialists are available promptly to help solve any metallurgical or casting problem. In short, they are constantly on the alert to fill the every need of your business—you are their biggest customer.

no foundry ever shut down because

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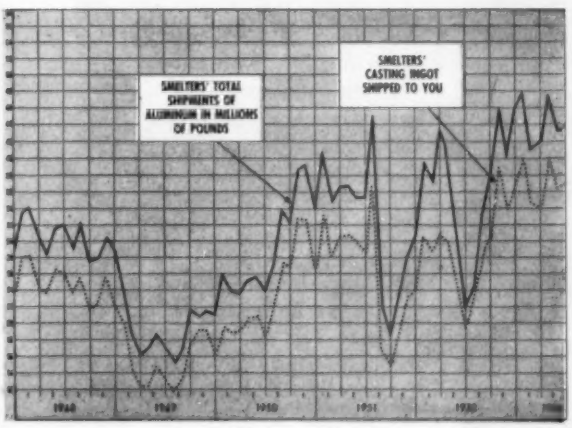
SHUT DOWN FOR ALUMINUM!



Take a look at this chart—it shows the relationship aluminum smelters' shipments of casting ingot bears to their total shipments. You see that year after year shipments of smelters casting alloys represent 80% of total shipments. It is our proudest boast that *no foundry or die caster ever shut down because he couldn't get aluminum ingot from the smelters*—especially when demand for aluminum was greatest.

We've shipped ingot that was still amost too hot to handle. But we delivered! In many cases, only hours after receiving an emergency call the aluminum smelter's shipment was sitting in your receiving room. We're proud of that service! We're proud, too, that we have always kept pace with the ever increasing complexity of your requirements.

When you need technical assistance or emergency help, call your aluminum smelter. He is your constant and dependable source of supply.

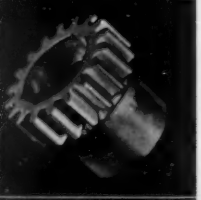
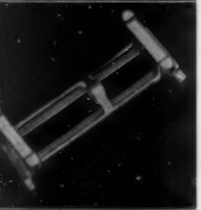
ingot was not available from smelters!

Aluminum Smelters Research Institute
20 North Wacker Drive, Chicago 6, Illinois

ATLANTALLOY

PLASTER MOLD CASTINGS CAN SOLVE YOUR DESIGN PROBLEMS

Atlantalloy plaster mold precision castings provide non-ferrous castings *cast to ordinary machining tolerances*, effecting definite savings in machining and other costly operations. Atlantalloys are characterized by high strength, durability, and many other advantages.

NO. 10 YELLOW BRASS *Atlantalloy*	An all-purpose alloy for brush boxes, gears, levers, etc. Fine grain, clean, smooth surfaces assure tightness. Easily machined. Free from porosity. Fatigue resistant.	
NO. 20 ALUMINUM BRONZE *Atlantalloy*	Excellent for gears and bearings. Strong, light, zinc-free. Highly resistant to corrosion. Machines well.	
NO. 31 *High Tensile* **MANGANESE BRONZE** *Atlantalloy*	High strength engineering material for gears, valve bodies, electrical mechanisms, etc. Extremely durable. No heat treatment needed. Can be cast in thin sections.	
NO. 40 *High Strength* **ALUMINUM** *"Tenzalloy"*	Attains high strength through natural aging. Free from internal stress and skin hardness. Ideal for machining.	
NO. 60 ALUMINUM *Atlantalloy*	Perfect as instrument alloy. Fully uniform with no internal strain. Can be used for accurate, thin-sectioned castings.	
WRITE..	for free copy of "Quality Precision Castings for Industry." Get full data on our plaster mold process and alloys.	

ATLANTIC CASTING and ENGINEERING CORP.

Established 1937

721 Bloomfield Avenue • Clifton, N. J. • PRescott 9-2450

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LETTERS TO THE EDITOR
continued from page 4

EXPERIMENTAL CASTINGS

My work often calls for the production of a small quantity of experimental castings, and I would be pleased if you will advise where I can get further information on the subject.

Also, I believe there is an authoritative magazine, like your own, in the moulded plastic field, and I would appreciate your furnishing me with the name and address of the publishers. — J. M.

Information forwarded. — Ed.

METAL COATINGS

Could you advise where to obtain books on metal spraying and electroplating? Am interested in chrome, nickel, copper, zinc and cadmium plating, and coloring of metals.

If possible, would also like a list of manufacturers who could furnish equipment for this type of work. — H. F. M.

Information forwarded. — Ed.

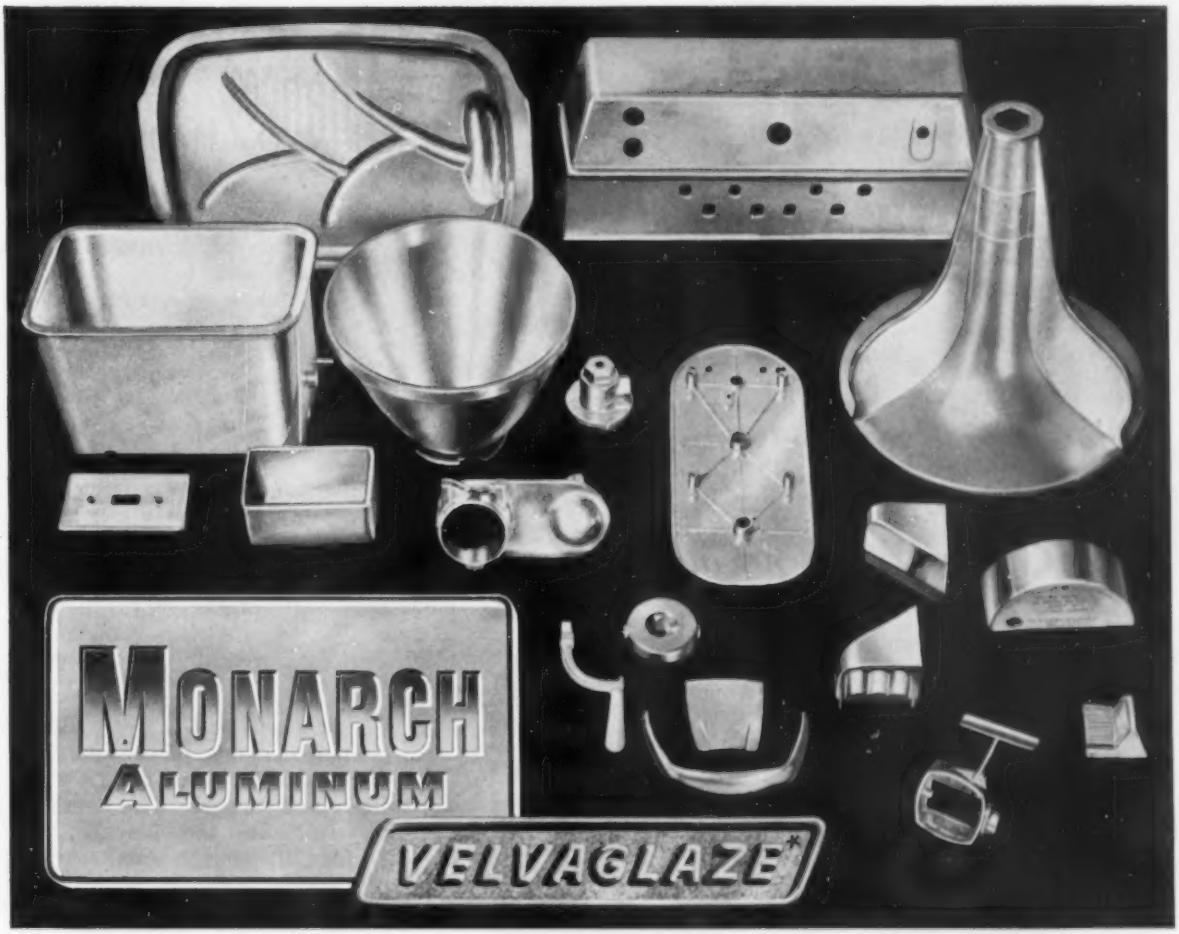
LOOKING FOR SOURCES

In your February 1954 issue of Page No. 57, you mention the Consolidated Vacuum Corporation as a manufacturer of vacuum metallizing equipment. Will you be good enough to give us their address? — R. I. L. (President)

In your January 1954 issue of "Precision Metal Molding" is an article entitled "Metallic Sealing Compounds Can Be Used for Production Impregnation."

We would appreciate your cooperation in sending us the address of the Tincher Products Co. so that we may obtain additional data of the process. — J. P. (Chief Standard & Materials Eng.)

Information forwarded. — Ed.



A SALES STIMULATING FINISH—

*with COST SAVING Advantages of UPF**

■ Imagine the practically unlimited opportunity to add unusual sales appeal and customer acceptance to your products with Velvaglaze.

We would like to show you in terms of the factual end costs of your products how Monarch's *Unified Production Formula eliminates hidden "extra" costs. We assume the undivided responsibility on many finished casting components to make such end results possible. Monarch's practical approach to all types of casting finishing methods has gained increasing acceptance by leading manufacturers in many industries, because Monarch's UPF* can accomplish factual *end cost* savings.

The parts illustrated are a few of the many current applications of VELVAGLAZE. Have a Monarch representative analyze your casting requirements today!

MONARCH ALUMINUM MFG. COMPANY

Monarch also produces quality Zinc Die Castings, with any finish under the certified zinc alloy plan.

Detroit Avenue at West 93rd Street
Cleveland 2, Ohio

ALUMINUM Permanent Mold Castings • ZINC Die Castings • ALUMINUM Die Castings • MACHINING • FINISHING • ASSEMBLY

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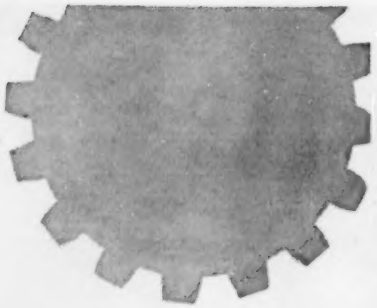
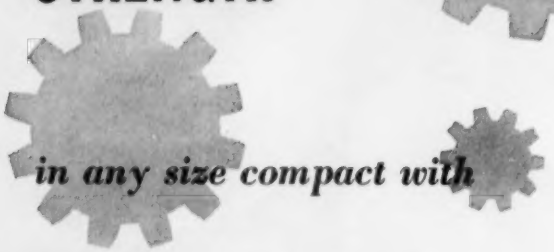
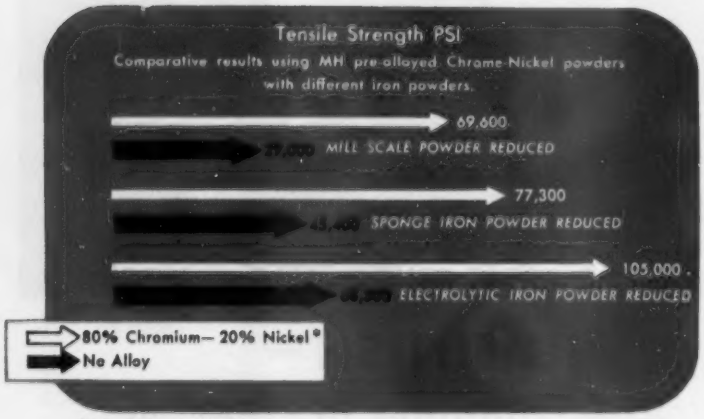
INCREASE TENSILE STRENGTH





in any size compact with

MH Chrome-Nickel *pre-alloyed powders*



*1% Carbon added

Regardless of the size of your iron powder compact, you can achieve tensiles up to 120,000 psi in one sintering by the addition of a small percent of Metal Hydrides' pre-alloyed Chrome-Nickel powders.

At one glance, this chart will show you the high physical properties of several iron powders combined with Metal Hydrides' Chrome-Nickel and perhaps show you the way to better the physical properties of your iron powder parts.

Write now for complete information without obligation. Your inquiry will receive prompt, interested attention.

MH **Metal Hydrides** INCORPORATED

20 CONGRESS ST., BEVERLY, MASS.

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Changes in personnel

Donld W. Walker has been appointed product manager for pig, ingot and billet of the *Kaiser Aluminum & Chemical Sales, Inc.*

Albert J. Welch is the new sales representative for southwestern Pennsylvania for *Frederic B. Stevens, Inc.*

William T. Walling has been named field engineer for the *Hanson-Van Winkle-Munning Co.* in the Chicago area.

Bernie H. Marks is the new manager of the Houston, Texas district office of *Pangborn Corp.*

Henry A. Getz has been appointed manager of the metal division of *National Lead Co.*, Cleveland branch. The territory includes the Cleveland, Buffalo, Pittsburgh area.

Charles A. Schneider becomes acting manager of the Baltimore branch to succeed Getz.

William F. Phillips has been appointed assistant manager of the miscellaneous chemicals dept. of *American Cyanamid Co.*

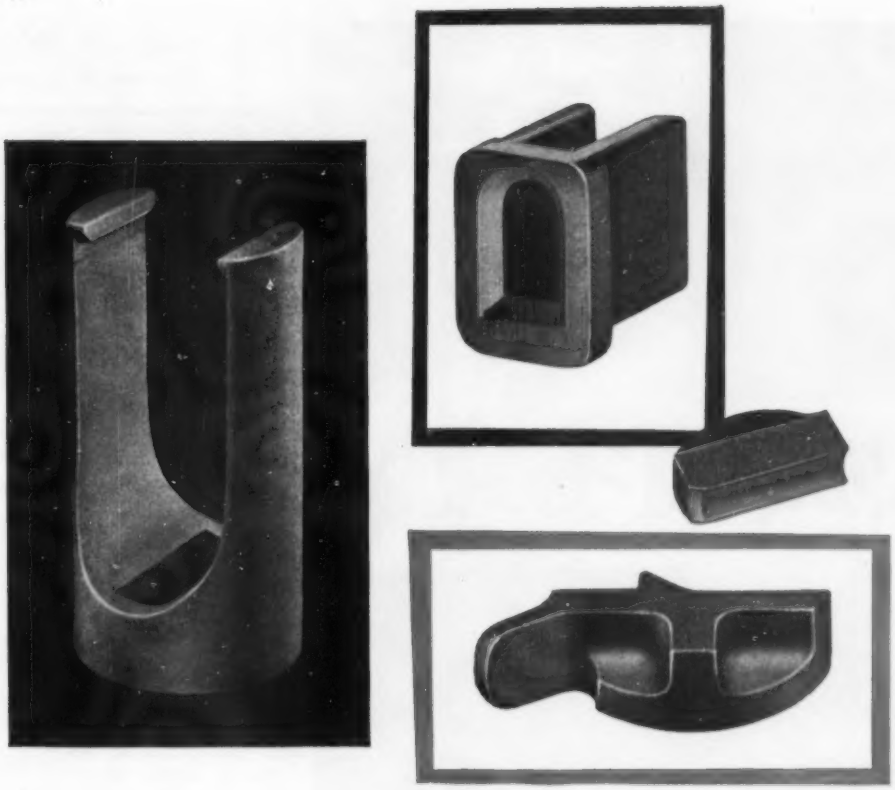
Dr. Edward A. Kern is the new manager of engineering for *General Electric Co.'s* silicone products dept.

Richard N. Pynchon has been named advertising and sales promotion manager of *Cowles Chemical Co.*, replacing **Elmer A. Lord** who remains with Cowles as sales rep in the Heavy Chemical Department.

William L. Milheim, William B. Sinclair, W. D. Matthews and **J. W. Morton** have been named district sales managers of the *Chemical Division, Celanese Corporation of America.*

John V. Schmitz has been appointed product engineer at

continued on page 12



improve product design . . .

cut manufacturing costs

with ACCUMET PRECISION INVESTMENT CASTINGS

In many cases design is restricted and function limited when alloy steel parts are made on conventional machinery from bar stock or forgings. Frequently such designs can be improved and production costs lowered by the use of precision investment castings. That's because this casting process permits the use of high alloy steels that are difficult to machine or forge.

Take these four component parts of a pneumatic tool for example. They are Accumet Investment Castings made by Crucible of 8620 steel. They have a smooth, satiny finish and are held to very close tolerances. If these parts were not made by this "lost wax" process, the pneumatic tool could not be produced at a practical cost in its present design.

Crucible engineers and metallurgists are available to help solve design and production problems through the use of Accumet Precision Investment Castings. Write now, and let them help you solve yours.

CRUCIBLE

first name in special purpose steels

54 years of Fine steelmaking

ACCUMET PRECISION CASTINGS

CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.

REX HIGH SPEED • TOOL • REZISTAL STAINLESS • ALLOY • MACHINERY • SPECIAL PURPOSE STEELS

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Fishing and Farming

Thompson Precision-Engineers Light Metal Castings for All Industry

THE fisherman trolling for the big one and the farmer working his south forty have one thing in common—both can count on Thompson. The fisherman's outboard motor and the farmer's tractor engine are each improved by precision-engineered castings produced by Thompson's versatile Light Metals Division.

In the case of the tractor, it's any one of several parts, including the piston, that is produced by Thompson — with the outboard motor, one of the parts produced by Thompson is the propeller.

Outboard motor propellers and tractor engine pistons are but two of the many light, strong, durable castings designed, developed and manufactured by Thompson for a diversified list of customer uses. Today Thompson is producing light metal castings for such products as buses and garbage disposers; washing machines and jet planes; automobiles and industrial engines; ice scoops and aircraft engines.

Behind this ability to aid all forms of industry are over 50 years experience in research and manufacture of precision metal parts. Regardless of your product, if you use castings, Thompson's creative engineers will gladly show you where and how you can simplify your operations and save on costs with Thompson Light Metals Castings.

For a detailed description of the Thompson Light Metals facilities which are available to you, send for your free copy of "Creative Castings." Just write to Dept. I-8 Light Metals Division, Thompson Products, Inc., 2269 Ashland Road, Cleveland 3, Ohio.

You can count on

Thompson Products

LIGHT METALS DIVISION

2269 Ashland Rd. • Cleveland 3, Ohio

For additional information Circle No. 65 on the Reader Service Card

CHANGES IN PERSONNEL
continued from page 10

the *General Electric Co.'s* chemical materials department.

Dr. Alexander Blakely has joined the *Metal Removal Co.* as vice president.

Frederick B. Stevens, Inc. has announced a number of promotions and appointments. **Charles W. Smith** as representative in the Chicago area, and sales engineer on indus- **F. W. Kittrell** as process and sales engineer on industrial waste, **Edwin Stanley Ogden** as sales representative for metal finishing supplies and equipment in Canada, **Nick Popa** as special equipment sales engineer in the foundry division, and **Byron H. Jacoby** as sales representative in the central states sales district.

Edward R. Bate has been appointed as sales manager of the *Cratex Mfg. Co.*

Phil H. Richey formerly assistant treasurer has been made assistant works manager of the *Detrex Corp.*

Walter T. Trezise is the new sales manager for the *Clover Mfg. Co.*

Jerome Tone, Jr. was made senior vice president and **Frederick T. Keeler** appointed director of sales for *The Carborundum Co.*

Oscar H. Hood has been named district sales representative for the states of Texas, Oklahoma, Arkansas and Louisiana for the *Hitchiner Mfg. Co.*

Thomas A. Printon is the new Chairman of the Board and President of *Nopco Chemical Co.*

Clifford T. Olsen has been appointed service engineer for the *Acheson Colloids Co.*

Why... ZINC ranks first in Die Casting

Zinc alloys are used to the extent of about two-thirds by weight of all die cast parts consumed annually in the United States. The comparatively low melting point of zinc makes it possible to produce die castings at a speed which cannot be attained with alloys based on other commonly available metals. The lower casting temperatures of zinc base alloys are also responsible for considerable savings in fuel cost, die cost and die maintenance.

Zinc alloy castings are stable, strong and rate highest in dimensional accuracy. The remarkably smooth surfaces obtained with zinc alloys in the "as cast" condition, keeps finishing work to a minimum. Frequently, only buffing is necessary prior to plating or for the application of other types of finishes. Due to the high fluidity of zinc alloys at casting temperature, die castings of highly complex design needing little or no machining can be readily produced.

The relative market value of the metals commonly used in die casting is not the only factor in choosing alloys for die castings. Production costs may counteract the difference in the metal cost.

DIE CASTING is the Process ● ZINC, the Metal ● BUNKER HILL, the Preferred Zinc

EASTERN SALES AGENTS **ST. JOSEPH LEAD COMPANY** 250 PARK AVENUE, NEW YORK 17

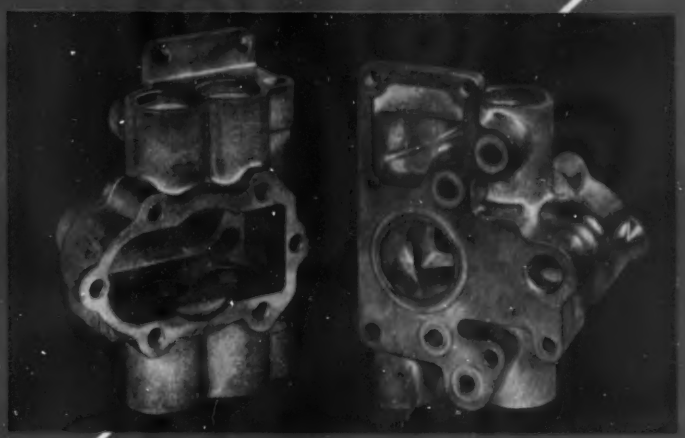
BUNKER HILL 99.99+% ZINC

SALES OFFICE FOR PACIFIC COAST **NORTHWEST LEAD COMPANY** SEATTLE, WASHINGTON

Reference Data offered in this month's advertisements

1. DRY-FILM LUBRICANTS — their application in die casting is discussed in Reprint DC and Bulletin No 426-E from Acheson Colloids.
4. THE ALUMINUM SMELTING industry, what it is and what it produces, is told in a reprint available from the Aluminum Smelters Research Institute.
6. COMPOSITION, PROPERTIES and casting data of die castable alloys is contained in the booklet "Die Casting Alloys" from Apex Smelting Co.
7. DESIGNING FOR INVESTMENT casting and the properties of castable alloys is the subject of a booklet published by Arwood Precision Casting Co.
8. PLASTER MOLD CASTING and the properties of metals and alloys cast by the process are discussed in "Quality Precision Castings for Industry." A copy can be secured from Atlantic Casting & Engineering Corp.
9. SIZES, PRICES, and other pertinent information about piston rings for die casting machines is available from Auto - Diesel Piston Ring Co.
12. ALLOY DATA, available ingot shapes and sizes and other information on Mastermet alloys can be secured from Canon-Muskegon in their brochure Mastermet Alloys.
13. A COMPLETE CATALOG of die casting machines and accessories is now available from Cast Master, Inc.
14. FOR HELP IN DESIGN and application of die castings, information is available from Central Die Casting & Mfg. Co.
18. TWO INFORMATIVE BULLETINS are now available from the Dollin Corp., one on the company's facilities and the other on small die cast parts
19. INVESTMENT CASTING alloys, properties and compositions, are discussed in literature from the Charles Dreifus Co.
23. CARBONYL IRON POWDER, its properties and uses are discussed in a 32-page booklet, "Carbonyl Iron Powders" published by Antara Chemicals Div. of General Aniline and Film Corp.
24. PROPERTIES OF METAL POWDERS supplied by the Glidden Co. are given in literature available from the company.
25. SMALL PARTS BY DIE CASTING, a descriptive bulletin and typical samples, are available from Gries Reproducer Corp.
26. THE HENNING MESSENGER brings news about casting alloys from Henning Bros. & Smith, Inc.
27. INVESTMENT CASTING APPLICATIONS are described in a new booklet published by the Hitchiner Mfg. Co., Inc.
29. CORE PINS FOR POWDER METAL dies, available, sizes and prices are contained in listings from Wm. T. Huchinson Co.
30. A CATALOG of die casting machines, particularly high speed all-hydraulic models, is available from the Hydraulic Press Mfg. Co. It is catalog 5106-A.
31. NON-FLAMMABLE hydraulic fluid developed by E. F. Houghton & Co. is fully described and its properties given in a new bulletin.
34. SOLVING PRODUCTION PROBLEMS through the use of investment castings is the subject of a booklet put out by International Nickel Co.
35. A MANUAL on investment casting is now ready for distribution by the Jelrus Precision Casting Corp.
39. DESIGN INFORMATION and application literature for aluminum and magnesium die castings are contained in literature from Litemetal Dicast, Inc.
40. DIE CASTING MACHINE catalog listing available sizes and types, as well as operating data, is ready for distribution from Lewis Welding & Engineering Corp.
43. CHROME-NICKEL POWDERS, and how they can increase the strength of metal powder compacts, are described in engineering reports from Metal Hydrides, Inc.
46. FIRE RESISTANT HYDRAULIC fluid, developed by Monsanto Chemical Co. is described in an engineering report Pydraul F-9.
51. A DESIGN MANUAL, "Dimensioning Die Castings" is published by Newton-New Haven Co. to aid the designer.
52. COST CUTTING with plaster mold castings is the subject of a brochure from Ohio Precision Castings, Inc.
56. GEARS AND RACKS for die casting and permanent molds are listed in literature available from Peerless Gear & Machine Co.
59. RACINE DIE CASTING CO. is the title of a brochure describing the facilities and services available from that company.
62. STAINLESS STEEL LADLES for handling molten non-ferrous metals are described and illustrated in the Spincraft, Inc. bulletin.
65. "CREATIVE CASTINGS," a description of the work, facilities and properties of light metal die castings by Thompson Products, Inc.
68. BARREL FINISHING the Abbott way is described in literature available from the Abbott Ball Co.

continued on page 19



* Pressure's ability to keep pace with the automotive industry is demonstrated in the volume production of such die castings as these ... for today's power steering assemblies!

This booklet brings our organization to you ... in words and pictures. Write for your copy today!

PRESSURE CASTINGS, INC.

die castings

ZINC AND ALUMINUM ALLOYS

CLEVELAND 19, OHIO

Wm. H. Sherer, Jr.
Sales Manager

Marshall P. Ralls
Ass't Sales Manager

Irving L. Bambrick Boston, Mass. Commonwealth 6-2864	John D. Goodin Indianapolis, Ind. Talbot 9345	R. E. Zimmermann Detroit, Mich. Trinity 5-7474	J. R. Hanna Rochester, N. Y. Monroe 5292	Manufacturers Sales Dayton, Ohio Melrose 3-6902

For additional information Circle No. 58 on the Reader Service Card

Powdered Metal *magic*

—provided by Glidden Resistox Metal Powders

Through the magic touch of powder metallurgy, more and more products and parts are being produced with amazing speed, accuracy and economy.

Keeping pace with this growth, Glidden is a primary source of metal powders that meet all standards of purity, consistency and resistance to oxidation. Tests prove that Glidden Resistox Copper Powders have 5 to 10 times the stability of ordinary powders. That's why Resistox is widely used for bearings, friction materials, brushes and parts of all types.

Resistox Lead Powders also provide performance advantages important to this expanding industry. These powders are available in a complete range of coarse to fine sizes.

May we supply you with more data on these and other Glidden products for your field—Glidden Cuprous Oxide, Cupric Oxide and Cubond (Copper Brazing Paste)? Detailed information gladly sent to you on request.

QUALITY Glidden PRODUCTS

CHEMICALS PIGMENTS METALS

THE GLIDDEN COMPANY

CHEMICALS • PIGMENTS • METALS DIVISION

Baltimore, Md. • Collinsville, Ill. • Oakland, Calif.
Hammond, Ind. • Scranton, Pa.

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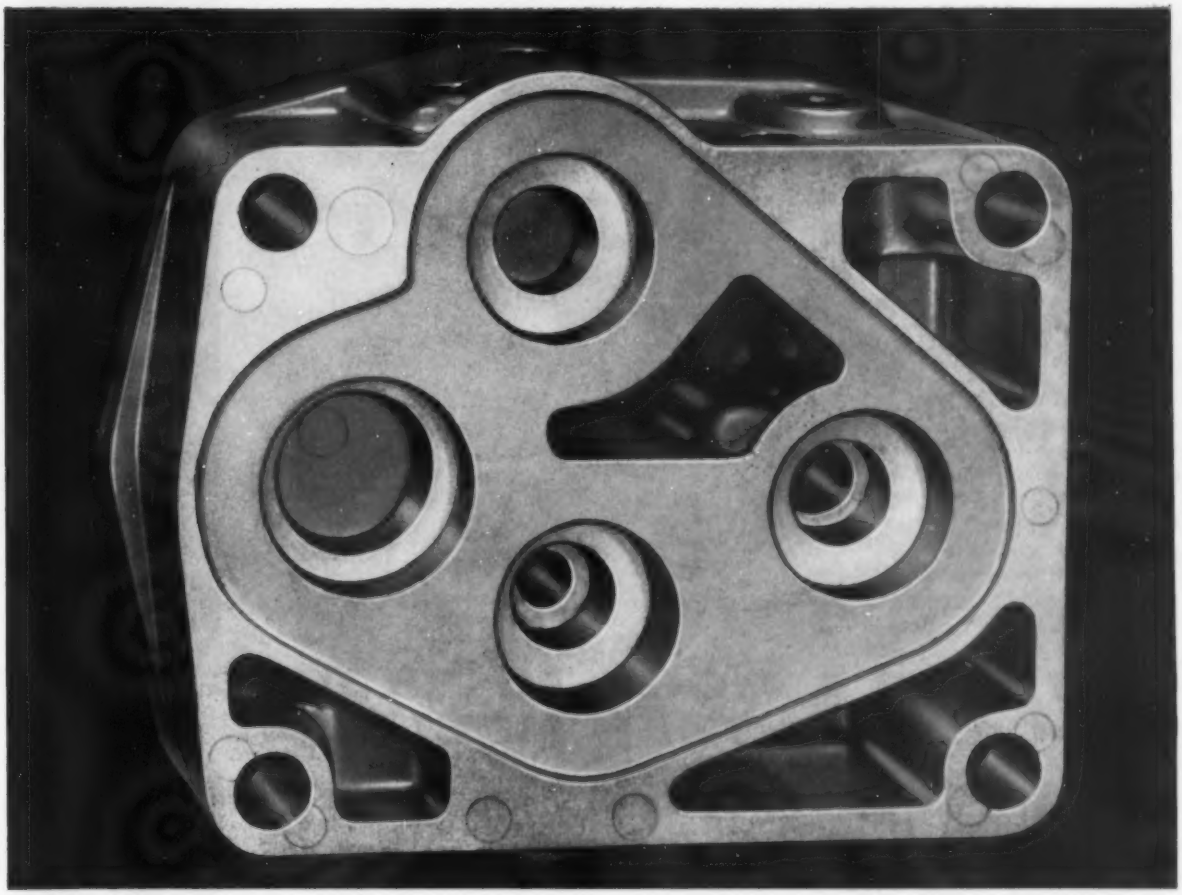


GRADE A DESIGNING with MADISON-KIPP zinc and aluminum die castings

Only a highly qualified engineer would be assigned the job of designing a selector valve like the one here illustrated. He can often do his best work by also utilizing the seasoned skill of Madison-Kipp craftsmen.

Please note the significant coring so vital to valving. There is Grade A Designing involved by both the principal and die casting contractor—Madison-Kipp.

We will welcome your inquiries.

kipp

MADISON-KIPP CORPORATION
213 WAUBESA STREET • MADISON 10, WIS., U. S. A.

• Skilled in Die Casting Mechanics • Experienced in Lubrication Engineering • Originators of Really High Speed Air Tools

For additional information Circle No. 41 on the Reader Service Card

. . . THERE'S MORE TO PRODUCTION DIE CASTING THAN MEETS THE EYE!

Only the LEWIS 650-B die-forge casting machine features injection pressures up to 100,000 pounds and the exclusive new 650-ton "HYDRA-LOCK" clamping mechanism.

"HYDRA-LOCK" assures maximum safety and prevents "spitting". Its design also provides for faster, easier die setting through a ball-and-socket action that compensates for misalignment of die faces within reasonable limits. Both final squeeze pressures and injection speeds are variable to meet individual job requirements.

Model 650-B is engineered to mass produce, with minimum scrap, high-strength low-cost aluminum and magnesium alloy parts weighing up to 9.5 pounds. Large platens . . . high-speed 2-stage injection . . . fingertip controls . . . and a remote power source for flexibility of installation combine to create a superior die casting unit.

Write for Catalog 103 today

1957-LW

LEWIS

MODEL 650-B

Safest, most powerful mold clamping device available today, "HYDRA-LOCK" utilizes a large-diameter short-stroke hydraulic cylinder to develop final closing and locking pressures up to 650-tons. Because of short stroke, only tenths of a second and a cupful of oil are required to accomplish final closing.

THE LEWIS WELDING AND ENGINEERING CORPORATION

63 INTERSTATE STREET • BEDFORD, OHIO

For additional information Circle No. 40 on the Reader Service Card

ETHYL SILICATE

Now available from Monsanto—England . .

Ethyl Silicate made by Monsanto Chemicals Limited.

AGENTS — Riches-Nelson Inc., 342, Madison Avenue, New York, 17.

Monsanto's Ethyl Silicate, which is sold under the trade name SILESTER O, contains a minimum of 40% Silica ; is very widely used as bonding agent for the fillers in the production of moulds for precision investment casting.

For full details, apply:—

Riches-Nelson Inc.,
342, Madison Avenue,
New York, 17, N.Y.

MONSANTO CHEMICALS LIMITED, LONDON, ENGLAND

For additional information Circle No. 48 on the Reader Service Card

REFERENCE DATA
continued from page 14

69. ENGINEERING DATA on the application and use of Iridite has been published by Allied Research Products, Inc.
70. BARREL FINISHING, its advantages, applications, and cost savings is the subject of a 52-page booklet from Almco Supersheen.
72. SELENIUM RECTIFIERS for all finishing operations requiring a D.C. source are described in a catalog from Bart-Messing, Corp.
73. LAPPING & FINISHING problems are analyzed and methods in a 36-page booklet from The Carborundum Co.
76. THREADED FASTENER booklet describing the application of threaded inserts is available from the Groov-Pin Corp.
77. TECHNICAL LLITERATURE on Durachem, a water white, baking finish, is now available from Maas & Waldstein Co.
78. COMPLETE BARREL FINISHING service, barrels, chips, and compounds all are described in literature from Minnesota Mining & Mfg. Co.
79. DRIERS FOR SMALL PARTS are described in a folder from New Holland Machine Co.
80. HOLE DEBURRING with power tools is the subject of a bulletin published by Nobur Mfg. Co.
82. OIL, GREASE AND SOIL removal the Oakite way is described in literature from the Oakite Co.
83. DIE REVITALIZATION through the use of Hydro-Finish is described in Bulletin 1400A available from the Pangborn Corp.
84. OPERATION DETAILS and specifications of tapping heads. Speeds, feeds, etc. are all covered in a circular from Procunier Safety Chuck Co.
85. BARREL FINISHING manual describing equipment, supplies, operating details and giving examples of cost saving finishing operations can be secured from Roto-Finish Co.
86. IMPROVED COPPER PLATING bath that is cyanide free and reduces buffing and polishing costs is described in bulletin CU-3 from United Chromium, Inc.

The Big Trend in Metalworking...

MOVE the metal ...it's cheaper than

HOW NEW METHODS SAVE BIG SUMS

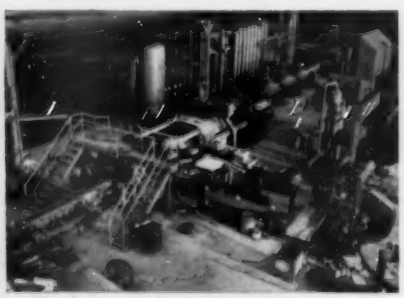
A. Parts are produced primarily by forcing metal into the desired shape rather than by "removing" or "machining" it. It is far faster . . . saves tremendously in time and labor.

B. The amount of metal in the initial slug, shot, billet, sheet, etc., is only slightly more than the total amount in the finished piece. Thus scrap and machining are held to an absolute minimum.

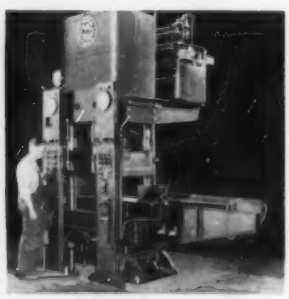
Metalworking plants casting about for ways to reduce production costs are turning more and more to the newer methods of forging, drawing and extruding in which metal is being "pushed around" rather than "removed." These processes basically are the hot extrusion of alloy steel, cold "pressure" forging of aluminum, cold extrusion of steel, and high pressure closed die extruding of aluminum and other non-ferrous alloys. Also falling within this category

Closed die extruding of heated aluminum reduced production time 99%.

Cold steel extrusion reduced scrap 43%



Hot alloy steel extrusion is now an established art.



Metal powder parts are often produced with no machining.

- *New and improved production techniques save millions... arouse widespread interest*

1. Actual parts production is cut from hours in typical cases to minutes or even seconds.
2. Pieces generally have superior finish and improved physicals including grain structure.
3. Tolerances and uniformity equal or better those of older methods.
4. Scrap is greatly reduced and in many cases practically eliminated.
5. Unit costs go way down.

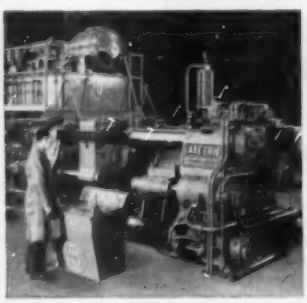
REMOVING it!

are somewhat older though greatly changed and improved methods for the extrusion of aluminum, hot forging of ferrous metals, powder metallurgy, deep drawing of sheet and die casting. The most recent developments involve variations and combinations of the above applied to many products and materials. Our engineers are in close daily contact with these developments. They'll be glad to help apply any of them to your production. Call or write us.

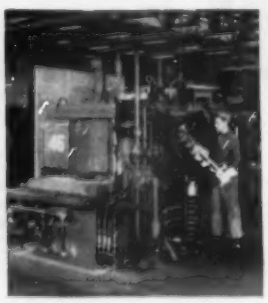
LAKE ERIE
HYDRAULIC
PRESSES

LAKE ERIE ENGINEERING CORP.
General Offices and Plant:
520 Woodward Avenue, Buffalo 17, N. Y.
District Offices in New York • Chicago • Detroit • Pittsburgh
Representatives in Other U. S. Cities and Foreign Countries
HYDRAULIC PRESSES • DIE CASTING MACHINES
ROLLING MILL AUXILIARY EQUIPMENT

New developments in steel forging have greatly expanded its application.



Non-ferrous extrusion installations now embrace titanium, magnesium and newer metals.



Production rates of die cast aluminum and zinc parts have been upped 20% to 30%.

PACKAGED INSTALLATIONS

A new service by Lake Erie which enables you to order an integrated installation ...including production equipment, tooling auxiliary equipment and advisory service ...from a single source thereby saving time, money and trouble.

LAKE ERIE®

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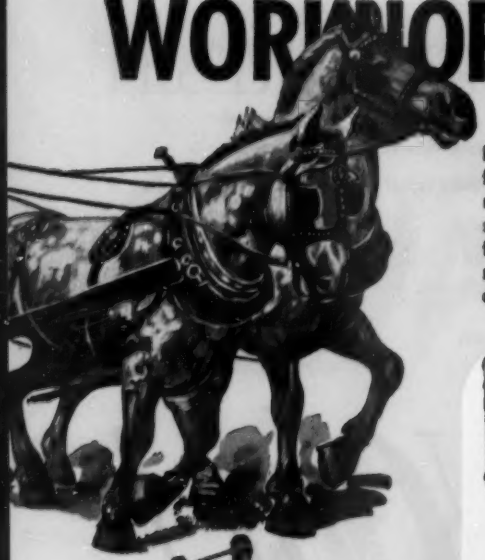
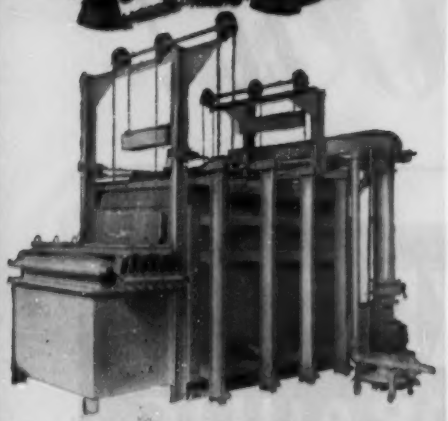
WORKHORSES for ALUMINUM

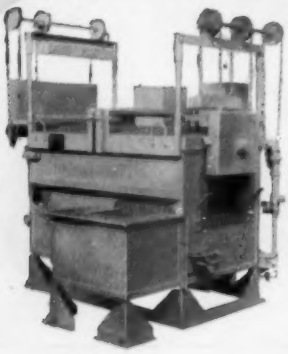


Here are the furnaces that bear the brunt of the burden in the aluminum foundry industry. They are designed for production of unsurpassed quality metal, in the fastest, most efficient and economical manner. Each has its specific purpose and capacity, meeting the exacting demands of sand foundries, die casters, permanent mold plants and smelters. They are recognized as the finest in the industry, reduce costs and make working conditions most agreeable. All furnaces may be fired by either gas or oil.



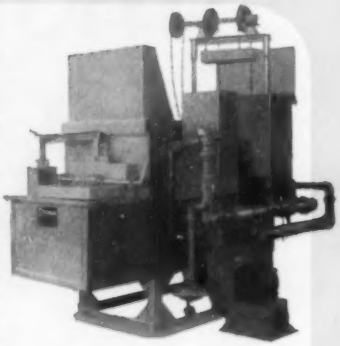
SMELTERS FURNACE

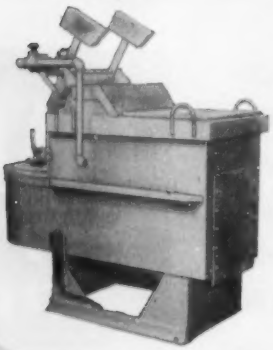
Built especially for smelters and other large melters. Easy charging, dressing, fluxing and alloying. Can be built to your own specifications. Capacities from 3000 lbs. Aluminum up.



MODEL "DC" FURNACE

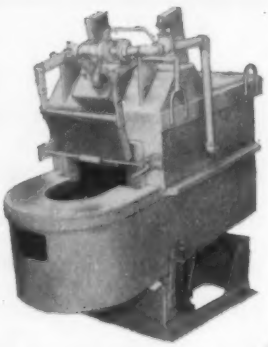
The 2 in 1 furnace. Breakdown and Holding in the same unit. Cold metal never reaches the molten bath. Assures metal of the finest quality on all classes of work. Close temperature control. Can be used as a sweat furnace for reclaiming inserts. Ideal for all types of plants including sand, permanent mold and die casting. Capacities from 350 lbs. Aluminum up.

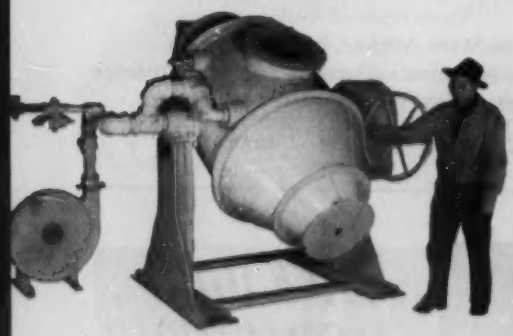




MODEL "DSC" DIE CASTING FURNACE

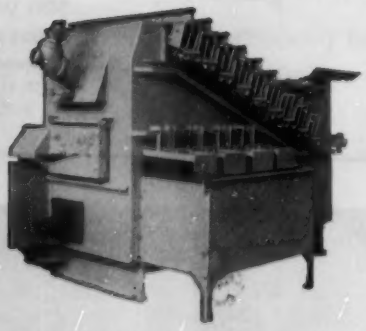
A small reverberatory furnace for melting and holding, or for holding only when hot charged at the die casting machine. Made in various sizes to meet your requirements.





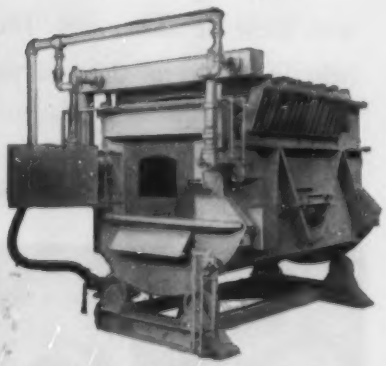
MODEL "BFC"

Hand tilt, open flame, barrel type furnace with flames firing tangent to inside of lining. Very fast melting. Used in all type plants including smelters. Capacities—500 lbs. Aluminum. A must for all aluminum jobbing sand foundries.



MODEL "MC" DIP-OUT TYPE

For melting and holding all in the same furnace. Hot metal always available. No iron pots or crucibles to replace. Capacities from 300 to 5000 pounds of aluminum.



MODEL "SW"—TILTING TYPE

Excellent to run back returns along with ingot required for permanent mold, die or sand casting operations. Also an ideal breakdown furnace. Capacities—500-1000-1700-3000 lbs. Aluminum.

STROMAN FURNACE & ENGINEERING CO.

DIVISION OF

THE PETERSEN OVEN CO. • 9900 FRANKLIN AVE. • FRANKLIN PARK, ILL.

Names and Trends in Markets · Materials · Applications

MORE ABOUT PISTON RINGS — In February, PMM presented the first report in this country on successful German use of powdered iron piston rings. Now, a major American automotive manufacturer is reported ready to start production of powdered iron piston rings. Extensive testing indicates that these new type rings have greater strength, improved elasticity and lower cost.

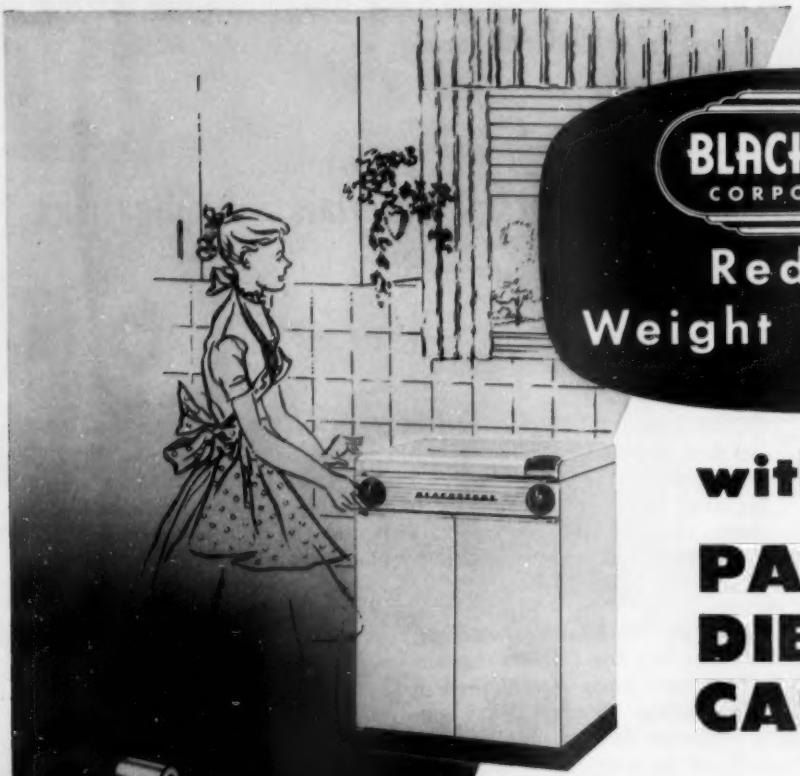
FOLLOWING THE LEAD of the American Die Casting Institute, it has been learned that the British Zinc Alloy Die Casters Association and the British Standards Institute have established a certification program for zinc alloy die castings. Several years ago, the ADCI inaugurated a voluntary program for its members in which zinc alloy die castings are certified to meet rigid specifications on composition.

MORE CASTINGS produced by advanced techniques such as die casting may find their way into use in military aircraft frames and engines as a result of projects currently in progress. These projects for the Navy and Air Force broadly cover casting process research and development, pilot production, and scientific casting design development and are aimed toward the design and pilot production of both airframe and air engine components to replace forgings and fabrications. Arthur Townhill, most recently manager of Thompson Products' die and permanent mold casting operations, has joined Alloy Engineering & Casting Company as an associate project director on these projects. He assists H. H. Harris, president of General Alloys Co., now on loan to direct this work for the Army and Air Force.

SIGNS of the expanding industrial picture in the Western area can be seen in the new plant construction just completed by Union Die Casting Co. who have moved into a new plant in Whittier, Cal.

BUSIEST MAN at the Tool Show in Philadelphia last month was probably Rog Waindle, president of the American Society of Tool Engineers and an active leader in the investment casting industry. He was one of the founders of the Investment Casting Institute last year.

HIGH-DENSITY, high tensile strength parts (up to 200,000 psi) from electrolytic iron powder are reported by a Boston company which has developed fabricating techniques. Work produced for a leading arms manufacturer by this process will be reported in PMM soon.



BLACKSTONE CORPORATION

Reduces Weight and Cost

with PARKER DIE CASTINGS

BLACKSTONE'S Full-Automatic Washer with the new flexible cycle is a distinct improvement over previous types. Today's housewife knows new leisure because of Blackstone's advanced engineering and design. For instance, the three parts shown here are Parker Die Castings. Costs are lowered since machining is virtually eliminated. Weight has been reduced without loss of strength. Parker Die Castings are in use in nearly every industry—cast to exacting alloy and design specifications by experienced Parker craftsmen. Call on Parker engineers the next time you need die castings. Each of us will profit.

and when you think of Die Castings THINK OF

Parker White Metal Company • 2153 McKinley Ave., Erie, Pa.

PARKER ALUMINUM *and* ZINC *Die Castings*

For additional information Circle No. 55 on the Reader Service Card

Reduce Fire Hazards

Use HOUGHTO-SAFE

the hydraulic fluid that won't burn or explode!

HOUGHTO-SAFE gives you this 4-WAY SAFETY!

SAFETY FROM FIRE

Houghto-Safe won't burn or flash—even when sprayed into open flames! This new hydraulic fluid . . . rated "acceptable from the fire hazard standpoint" by the Factory Mutual Laboratories . . . now proves that fire-resistant qualities *can be obtained without loss in operating efficiency!*

SAFETY FROM WEAR

Houghto-Safe is reinforced for high film strength —longer life for moving metal parts.

SAFETY FROM TOXICITY

Houghto-Safe is non-toxic—safe to handle—has no unpleasant odor!

SAFETY FROM PACKING ATTACK

Houghto-Safe has no ill effect on synthetic rubber packings—won't impair efficiency! Ask the Houghton Man for our new bulletin, containing research data, case histories and pictured proof of Houghto-Safe's efficiency. Or write to E. F. Houghton & Co., 303 W. Lehigh Avenue, Philadelphia 33, Pa., for answers to any questions you may have about this new, safe, hydraulic fluid.

HOUGHTO-SAFE **Non-Flammable Hydraulic Fluid**

. . . a product of

E. F. HOUGHTON & CO.

PHILADELPHIA · CHICAGO · DETROIT · SAN FRANCISCO

Ready to give you on-the-job service . . .

Advt. No. 2-54—
Beaumont, Heller & Sperling, Inc.

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Tamms

SPECIAL SILICAS

WRITE FOR PRICES

AMORPHOUS
CRYSTALLINE
DIATOMACEOUS

SIZE RANGE FROM 100 TO 600 MESH

All grades of silica ideal for precision casting by the investment molding process

Will meet the exacting requirements of most precision casting work

Precision quality to assure uniform casting performance

AND SAMPLES

FINE • PURE • WHITE • UNIFORM

TAMMS INDUSTRIES, INC.

Dept. RM-15 228 N. La Salle St. Chicago 1, Ill.

SHELL MOLD

CASTINGS by OLSON

These aluminum gear box castings for jet aircraft actuators are produced by OLSON for the John Oster Mfg. Co. who report, "The castings have to be strong, sturdy and free of blowholes. These shell mold castings from Olson meet all requirements . . ."

OLSON PATTERN & FOUNDRY WORKS

1711 Magnolia St. • Rockford Ill.

Send prints for quotation.

Attach to your prints

Please send us quotation on the attached drawings.

Name .....

Company .....

Address .....

Circle No. 53 on the Reader Service Card

Between the Lines of this and future issues

Shell Molding: What It Is and What It Ain't . . .

A down-to-earth evaluation of shell mold castings begins on page 44. It's the first of three parts giving designers some idea of what goes on in making shell mold castings. This article, originally written as a series of letters by a foundry executive, suggests that there are more advantages in shell mold casting than meets the eye.

There's Room Here for Both . . .

Some folks have been heard to suggest that aluminum die castings have been replacing zinc die castings. Now, a spokesman for the die casting industry reports some figures to show that both metals are holding their own and that there is little truth to gossip that one is replacing the other. The report begins on page 34.

What's New on Powdered Iron Rotating Bands . . .

So many questions have arisen lately about the status of the Army's powdered iron rotating band program that we interviewed the chairman of the American Ordnance Association's rotating band committee. His comments appear on page 48.

Aluminum With a Sole of Iron . . .

Best features of two metals can be combined by a new bonding technique that attachs steel or iron to aluminum. How it works out in practice can be seen in a report on new die cast aluminum irons having .010 stainless steel bonded to the sole for hardness. Turn to page 49 for the story.

Stainless Steel Powders . . .

Four tables giving chemical composition, screen analysis, physical properties of powders, and typical properties of compacts are features of an article beginning on page 54 describing a new stainless steel powder.

the tone is clear because the design is simple . . . with

DIE-CASTING

CASE HISTORIES FROM MT. VERNON FILES

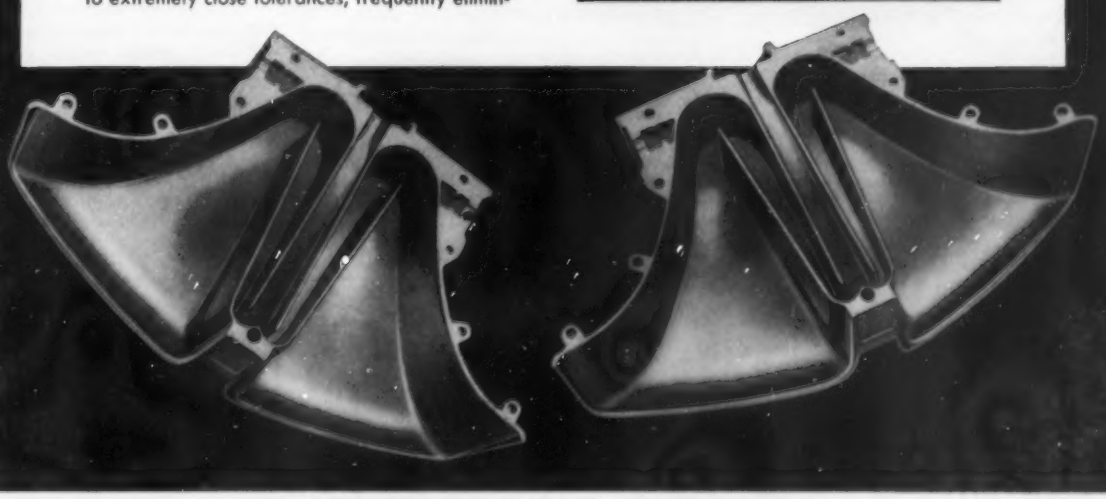
A greatly improved Hi-fi Speaker — at a reduced manufacturing and assembly cost—are the benefits University Loudspeakers, Inc., gain from the design of their new wide-angle reproducing trumpet, Cobreflex-2.

This effective design was made possible by die casting; one part replaces three spun sheet metal parts previously needed in their other horns. The trumpet assembly combines two identical aluminum die castings, to produce a pair of exponential horns having twin air columns in a single assembly. A "dual exponential flare design", University calls it—its advantages: a smooth, even radiation pattern of sound, free from the cancellations that come from cellular and multi-mouth horns. Tone arm and reflectors being integral, there are no separate parts to loosen and vibrate.

Yes, die casting keeps construction *simple* . . . and in almost any manufactured part, simplicity gives the best results. Die casting can be done to extremely close tolerances, frequently eliminating the need for machining. This too brings costs down.

Whatever *your* product, you can almost certainly profit by considering the advantages of die casting; light weight, simplicity, lower costs. You may find, as did University Loudspeakers, that an improved new design is made possible. Our varied experience of many years is wholly at your service. Let us know your needs today.

MT. VERNON
DIE CASTING CORP.
STAMFORD, CONNECTICUT



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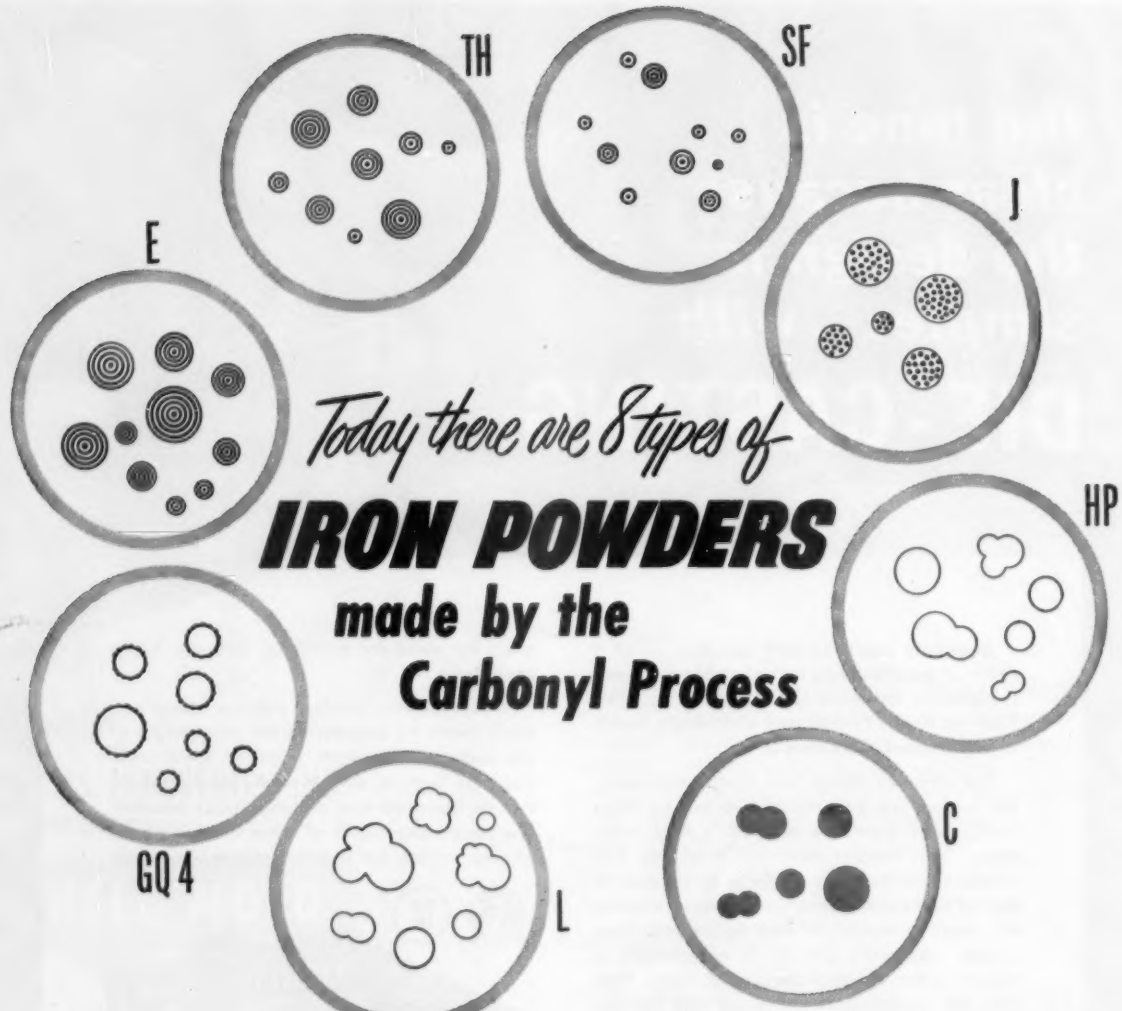

Today there are 8 types of

IRON POWDERS made by the Carbonyl Process

These powders are microscopic particles of extremely pure iron—spherical or agglomerations of spheres. The particles differ in size, in structure and in chemical composition and are thus adaptable to many different uses. Produced in eight carefully controlled types, the particle sizes range from one-half to twenty microns in diameter. The iron content of some types is as high as 99.6—99.9%.

Now widely used in high frequency cores for many communications systems, several types may also be used as alloying agents, as catalysts, in pharmaceuticals, magnetic fluids and many applications in powder metallurgy.

The powders make for ease of sintering. Added in metal parts, they also permit controlled shrinkage of the finished sintered part. In other applications, they impart greater ductility and strength to the finished piece. Desirable properties and qualities of powdered metal parts are enhanced by using these powders—either in whole or in part.

This 32-page book offers you the most comprehensive treatment yet given to the characteristics and applications of G A & F Carbonyl Iron Powders. 80% of the story is told with photomicrographs, diagrams, performance charts and tables. . . . We invite you to call upon our research facilities and Technical Service Department for assistance in developing new applications or new products involving the use of any of these powders. Kindly address your inquiry to Department 81

E Steel-like, concentric shell structure, weight average diameter 8 microns

TH Steel-like, concentric shell structure, weight average diameter 5 microns

SF Steel-like, concentric shell structure, weight average diameter 3 microns

J Alloy, face-centered cubic crystals, higher resistivity, weight average diameter 8 microns

HP Soft, pure iron, high magnetism, weight average diameter 10 microns

C Soft, low hysteresis, weight average diameter 10 microns

L Soft, larger particles, many agglomerates, weight average diameter 20 microns, pure iron

GQ 4 Soft, refractory coating on particle surface, weight average diameter 8 microns

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Abundant Supplies of aluminum

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BECAUSE of the rapidly expanding capacity of the aluminum industry—led by Kaiser Aluminum—you can be sure of adequate supplies of pig, ingot and billet, now and in the future.

Now, as before, our business is serving manufacturers—rather than manufacturing our own end products. As a result, Kaiser Aluminum, of all domestic aluminum producers, provides the highest amount of primary aluminum for the use of foundries and independent fabricators.

We'll be glad to work with you on your fabricating problems. Contact the Kaiser Aluminum office listed in your telephone directory. Kaiser Aluminum & Chemical Sales, Inc., *General Sales Office:* Palmolive Bldg., Chicago, Illinois; *Executive Office:* Kaiser Bldg., 1924 Broadway, Oakland 12, California.

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Faster service and delivery on orders from our conveniently located plants at Newark, Ohio; Chalmette, Louisiana; Halethorpe, Maryland; Mead and Tacoma, Washington.

Dependable source of supply because we are an integrated producer.

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Our ability to produce to all standard specifications or to all special customer specifications.

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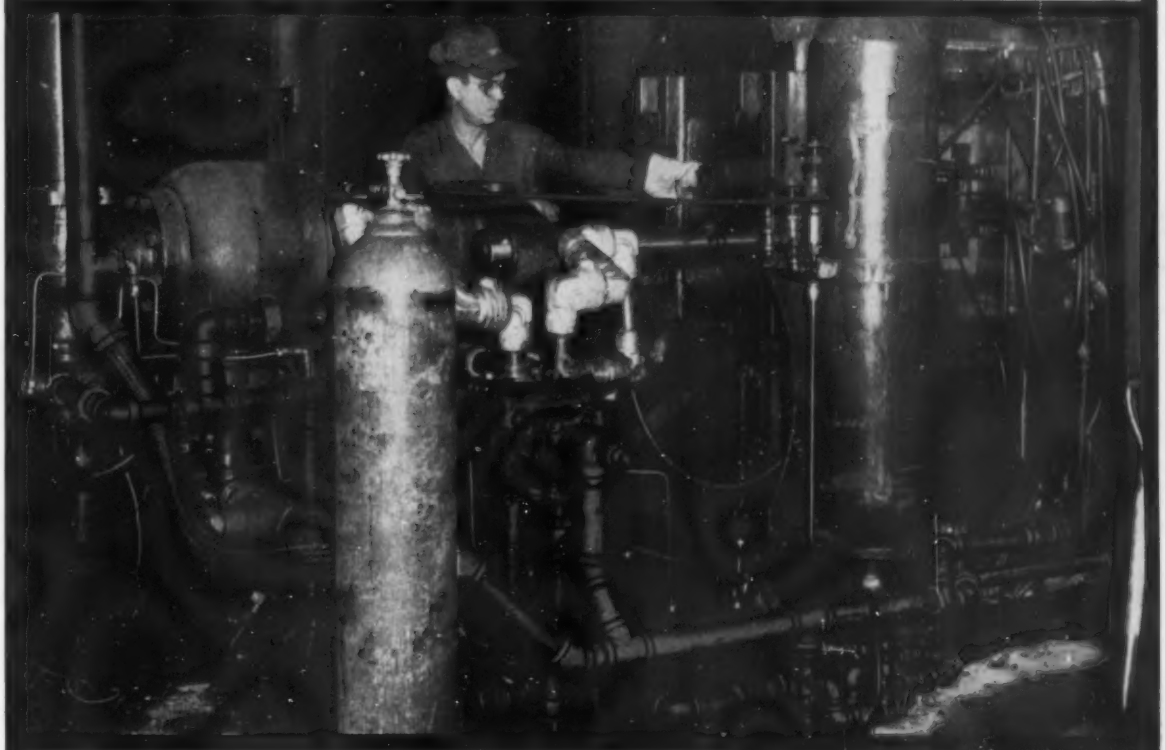
For additional information Circle No. 5 on the Reader Service Card

How Mall Tool Puts Safety in Hydraulic Lines

FIRE-RESISTANT PYDRAUL F-9



How to make die-casting machines safer for operators, more efficient in production? Mall Tool, manufacturer of more than 1000 separate portable items—many of them die-cast—does it this way:

One by one, they are converting their machines to Pydraul F-9. Under test, this remarkable hydraulic fluid will not sustain flame even when sprayed into a 6000° F. oxyacetylene jet. If a hose should rupture, Pydraul would spray harmlessly into pots of liquid metal or even into furnace flames.

No waste, no corrosion. Mall finds oil make-up per machine averages 60% less with Pydraul than with ordinary fluid. Pydraul has a chemical base—not water or petroleum—and is noncorrosive to metal parts. It can be re-used again and again with no loss of lubricating characteristics.

Soon all Mall hydraulic machines will have Pydraul in their lines.

Pydraul's recent price reduction makes it more than ever the most economical fire-resistant fluid in actual use.

Write for this engineering report, "Pydraul F-9."
Organic Chemicals Division, MONSANTO CHEMICAL COMPANY, Box 478, St. Louis, Missouri.

37% less evaporation in Pydraul than in water-based fluids . . . one reason why make-up rates are many times lower with the Monsanto fluid.

Pydraul Reg. U. S. Pat. Off.

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Scovill Mfg.

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Kearny, N. J.

Westinghouse

and others...

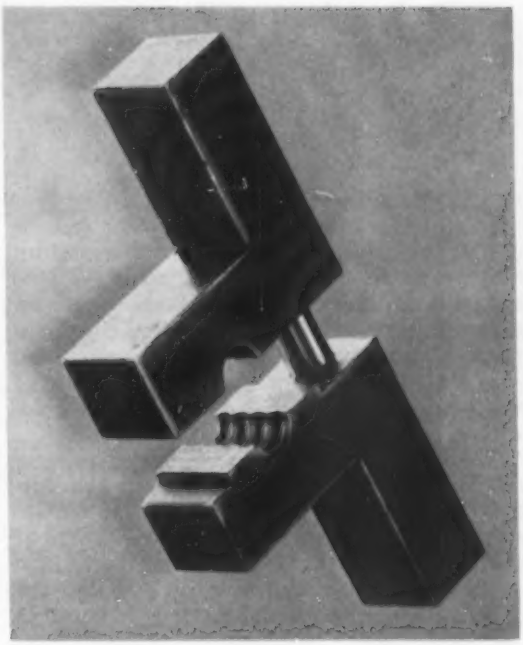
Such patronage must be deserved

THE NEW ENGLAND DIE CASTING CO.

West Haven, Conn.

To bring the price of these crimping dies within reach of the average machinist, they are now being converted . . .

From Machined Bar To Investment Cast



TO fasten a flexible hose to a metal stem, a wide variety of clamps and fasteners have been developed. Where a permanent fastening is desired, it is usual practice to crimp a metal ferrule around the assembled tube and stem. Such a fastening normally requires special equipment, often quite large and seldom portable.

To provide a field clamp that is easily transported, the Breco Mfg. Co., Inc. has developed a simple crimping die that can be used wherever a machinist's vise or similar clamping devise is available and further the crimping die can be carried in a tool box. A die for handling ¼ inch tubing is shown.

As originally designed and first manufactured, the crimping dies were made from bar stock, fully machined and hardened. This method of manufacture was so expensive that the selling price of the dies had to be above the level where the average mechanic could afford them.

To reduce the manufacturing costs, the method of fabricating the crimping dies has been changed to investment casting. The castings, to be made by the Jelrus Precision Casting Co., will be in SAE 1020 steel and will be complete except for the dowel pin holes. All of the necessary lettering that is now hand stamped will, of course, be engraved in the mold to became a part of the casting operation.

After the castings are received from the foundry, the only machine work required will be to bore the two holes for the dowel, case carburize and harden.

Early estimates indicated that by conversion from a machined part to an investment casting, the cost of manufacturing this crimping die will be cut by 75 percent.

The 1954 Die Casting Program

BY DAVID S. LAINE, Secretary
American Die Casting Institute

THE question of the 1954 Die Casting Program, particularly as it affects zinc, is one of great importance both to the zinc industry and to the die casting industry. Zinc base alloys used for die castings represent about 30 percent of total slab zinc consumption which makes it important to you — and zinc die castings represent about 50 percent of the total dollar volume of die castings sold, which makes it important to us.

We know that the zinc industry has been as troubled as we have been about the outlook for a continuing high use of zinc for die castings over the past several years. Some of the troubles were fancied some, fact. And so in trying to determine a realistic and dynamic program for die castings it becomes necessary that we review the immediate past — analyze the facts available — and plan the future soundly.

In the past few years, many stories about falling volume of zinc die castings and the reasons therefore have gained currency. These stories cited many causes including:

- Shortages of zinc
- High prices for zinc
- Wild fluctuations in zinc prices
- Fear of high tariffs to force an uneconomic price for special high grade zinc.
- Shortages of nickel for plating zinc die castings, and
- The switching of applications from zinc to aluminum die castings.

ZINC — 1953 saw shipments of 512 million pounds . . .

END USE	JOB SHOP CASTERS SHIPMENTS OF ZINC ALLOY DIE CASTINGS (POUNDS: 000 OMITTED)				
	1949	1950	1951	1952	1953
MOTOR VEHICLE	124,000	173,250	137,800	126,500	165,500
HOME APPLIANCE	52,000	71,000	53,450	50,300	68,500
OFFICE, INDUSTRIAL, COMMERCIAL MACHINES	21,200	31,250	26,900	29,500	36,450
SCIENTIFIC, COMMUNICATIONS, PHOTOGRAPHIC EQUIPMENT	9,600	18,000	15,200	16,750	22,400
PLUMBING, HEATING AND BUILDERS HARDWARE	12,400	23,000	15,750	13,600	18,200
NATL. DEFENSE	400	750	25,100	15,200	15,800
OTHER	12,400	22,750	17,800	14,150	17,150
TOTAL JOB SHOP	232,000	340,000	292,000	266,000	344,000
ESTIMATED CAPTIVE	144,000	194,000	160,000	140,000	168,000
TOTAL DIE CASTING	376,000	534,000	452,000	406,000	512,000

Is zinc losing ground to aluminum as a die casting alloy? No, says this spokesman for the die casting industry who offers statistics to prove that the two metals are enjoying parallel growth. This paper was delivered before the annual meeting of the American Zinc Institute April 21.

I do not intend to talk about the shortage of supply or high prices for zinc — not even about tariffs.

I would, however, like to look into the other matters for a moment — including low prices for zinc.

First, I should like to examine the story that zinc die casting application have been switched to aluminum. I have here two tables showing the distribution of die castings produced for sale according to end uses — one table for zinc and one for aluminum.

I am not going to read a lot of numbers to you — you can examine these data at your leisure if you care to. I do, however, want to look for the places where aluminum die castings were substituted for zinc.

Let's look at **Motor Vehicle** use — the largest application for either zinc or aluminum. On the face of it, zinc in 1953 did not recover its 1950 volume while aluminum has gained considerably. The fact is, that since 1950 the increasing production of passenger vehicles with automatic transmissions accounts for the increase. Since the die castings used in automatic transmissions could not be zinc for reasons of weight and engineering, no substitution is involved.

Home appliances represent the second largest group of applications. 1953 zinc die casting shipments to these consumers were

continued next page

ALUMINUM — Automatic transmissions helped sales . . .

END USE	JOB SHOP CASTERS SHIPMENTS OF ALUMINUM ALLOY DIE CASTINGS (POUNDS: 000 OMITTED)				
	1949	1950	1951	1952	1953
MOTOR VEHICLE	15,300	29,350	21,000	28,950	47,900
HOME APPLIANCE	25,300	39,350	26,300	27,150	37,750
OFFICE, INDUSTRIAL, COMMERCIAL MACHINES	15,300	26,300	18,650	16,950	29,800
SCIENTIFIC, COMMUNICATIONS, PHOTOGRAPHIC EQUIPMENT	9,850	16,300	12,300	13,000	16,900
PLUMBING, HEATING AND BUILDERS HARDWARE	2,300	5,100	4,125	2,175	4,100
NATL. DEFENSE	1,700	2,300	18,100	30,850	35,000
OTHER	6,250	8,800	5,525	8,425	13,550
TOTAL JOB SHOP	76,000	127,500	106,000	127,500	185,000
ESTIMATED CAPTIVE	12,000	16,500	22,000	28,000	51,250
TOTAL DIE CASTING	88,000	144,000	128,000	155,500	236,250

Seven Point Program Set Up By Two Industry Associations

within 3½ percent of the 1950 high point. Aluminum shipments were off 4 percent. Certainly not substitution.

Office and Commercial Machines applications are the next most important consuming group. 1953 shipments of zinc die castings for such uses were 16 percent higher than 1950 tonnage. Aluminum was 13 percent higher than 1950. No marked evidence of substitution in these applications—both zinc and aluminum consumption reached new high points.

In the field of **communications equipment** (TV and radio included), **photographic equipment and scientific devices** zinc die casting use had increased in 1953 some 23 percent over the 1950 high. Aluminum use was up 4 percent. This might look like substitution in reverse but the facts indicate that high television receiver production with zinc bezels account for considerable of the growth. This application is a normal use of zinc die casting and so zinc was used.

In passing, please note that both zinc and aluminum are off 20 percent from their highest use for **builders hardware and plumbing goods** applications—a remarkable parallel in line with the previous examples.

In the so-called "all other use" category, which includes transportation, other than motor vehicle (railroad, motorcycles, outboard motors); **toys; sporting goods; timing devices; beauty and barber shop devices; jewelry** and other miscellaneous use, zinc is off 25 percent and aluminum up 50 percent.

So here is the apparent basis for the substitution story—which we as die casters do not feel has had any substantial effect on our zinc volume.

The fact is that the evidence does not really support substantial switching of die casting applications from zinc to aluminum.

The fact is that our sales indicate a remarkable parallel in trend — both in total and in customer industry use. Yet 1953 was an unsatisfactory one as far as zinc die casting volume was concerned.

With motor vehicle production almost as high as in the peak year — and with new body models and designs using more zinc die castings in trim and hardware, our volume was down. Deeper examination has shown us that the supply-price-plating-tariff matters have all been negative factors adversely affecting the confidence of designers and purchasers in the use of zinc die castings for heavy applications.

I will cite a case in point. In February of this year, supply and price of zinc were most favorable from the standpoint of the user of die castings. Indications were that one major automobile producer would return to die cast grilles on the 1955 models of some of their motor cars. Prices appeared favorable as opposed to stainless steel stampings. But at just that time publicity with regard to additional government stockpiling of nickel, and reductions in supplies for electroplating appeared. The car manufacturer is reconsidering. Dies and tools for die casting production of a grille take six months to build and cost several hundred thousand dollars. If nickel were to be short in late 1954 and 1955 there might be no grilles or at best a bad production impediment. As a result it appears that a stamping may be used — although rumor not fact is the reason.

The anticipated 1955 production of these vehicles is some 450,000 units. The zinc die cast grilles weigh about 20 pounds each or 4500 tons — 4500 tons of zinc neither you nor we will sell. The tragic part of the story is that less than 60,000 pounds — less than 30 tons of nickel are needed in the plating of these grilles.

Such things kept zinc die castings below the point they could have reached in 1953, and are right now determining volume for 1955.

No one is satisfied when such a decision is made. The automobile manufacturer and the automobile buyer would prefer the lasting service as well as beauty of design possible in the die casting. We as die casters need this type of business for full utilization of our equipment and labor. The zinc producer and miner may lose almost 2 percent of zinc die casting potential — all on one questionable policy relating to a minor use of nickel.

This incident indicates, in addition, why the low price of zinc is not a panacea. I might add at this point that the present uneconomic level of zinc prices is definitely not a boon to the die caster. Die casting prices are reg-

continued on page 84

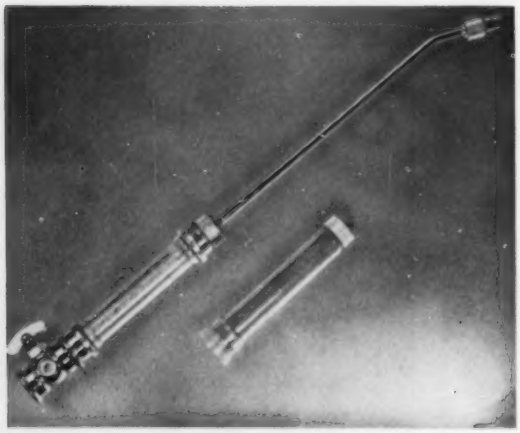
Die Castings In The Garden

BRIGHT-EYED garden enthusiasts are lining up at the counters of hardware and gardening supply stores at this time of year, scanning the market for new devices and gadgets. Many of these new products for tending the yard or garden depend upon zinc or aluminum die castings to sell them, because die castings make a product look better, cost less, and work more efficiently. Two outstanding examples of today's garden products that use die castings are presented on the following pages.

Die Castings in the Garden | Case No. 1

Design Of A Metal-to-Plastic Joint That Resists Stress

BY W. E. CUMMINGS, President
Garden Hose Spray Co., Inc.



1. TRANSPARENT PLASTIC cartridge between a pair of die cast zinc fittings, allows the user to see how much of the insecticide cartridge remains.

2. TWO ASSEMBLY METHODS are compared in this photograph, right, which shows how the advantages of die casting have been used more fully in the new design than in the older one.

THE insertion of a transparent section in an otherwise opaque pipe line is generally solved by introducing a section of glass or plastic tubing and holding it in place by gasketed compression rings. Flanges may be molded onto the transparent tube and the section held by gasketed flanges. In some cases, however, the metallic end pieces which join a plastic tube to a metal pipe line are molded onto the plastic. This method has been successful provided there are no torsional or tensile stresses.

In the insecticide sprayer, Figure 1, made by the Garden Hose Spray Co., a transparent plastic pipe section was essential so that the amount of insecticide cartridge remaining in the sprayer could be observed. The joint between the metal and the plastic is, in use, subjected to considerable torsion whenever the unit is opened to insert or remove a cartridge. There is also a heavy tensile stress, since people will pull on the unit. At the same time, it must withstand water pressures that may run over 100 lbs. gage.

As the part was originally designed the plastic tube section was screwed into die cast zinc end connectors, using rubber gaskets to prevent leakage. The metal was then lightly crimped onto the plastic tube. This type of assembly, shown in Figure 2, was not satisfactory in several respects. When the unit was disassembled, too often it came apart where the plastic screwed into the metal connector. After this had occurred a few times, the threads on the plastic tube became sufficiently worn so that it was no longer possible to retain the assembly water tight.

Another disadvantage of this type of construction was that it was weak in tension. A moderate pull on the nozzle was enough to strip the threads and ruin the plastic cartridge container. Obviously, if either of the failures indicated above occured there would be continual leakage, particularly when the water pressure was somewhat higher than usual.

In the crimping operation, the chromium plating would often crack and flake, leading to a considerable amount of rejects.

Finally, the last major objection to this assembly was the overall cost. In addition to the machining of threads, assembly was a hand operation

Here's a neat design solution to the problem of inserting a piece of molded plastic between two metal end connectors so that the assembly will resist torque, internal pressure and tensile stress. In the process of redesign, this garden spray manufacturer has also saved more than 75 percent on manufacturing costs.

and two rubber gaskets per unit were required. All of this extra machine work and assembly increased costs beyond a tolerable figure.

When redesign was undertaken, the connector-to-plastic assembly was given first attention. The logical approach was to mold the plastic directly onto the die cast end pieces, provided adequate anchcorage could be achieved. A highly satisfactory connection was achieved by casting four small lugs onto the inside of the metal connectors. With the plastic molded around these lugs, the strength of the joint in torsion was greater than that of the plastic tube. To provide adequate bonding and anchoring against tensile stresses, a ridge was formed in the casting operation on the outside of the connector and the plastic tube. Since the strength of the plastic in both torsion and tension is greater than any stresses to which the spray unit is subjected in service, the assembly, Fig. 2, has proven most adequate. In fact, since the design was changed not a single sprayer has been returned because of joint failure.

The substitution of the molded joint has another advantage: it is considerably less expensive. The present die cast connectors are no more expensive than the older type which required a thread cutting operation. Molding the plastic onto the metal has not appreciably increased the cost

continued on page 92

Product Design For Easy Assembly

BY GEORGE DITTRICH, Project Engineer
Metallizing Engineering Co., Inc.

THERE are two general methods of watering the lawn. You can put your thumb over the end of the hose and "squirt" or you can use a METCO Wave Sprinkler. Assuming a case of paralysis of the thumbs, either real or imaginary, one of the most efficient methods of watering is possible at a low tooling cost thanks, in part, to die castings.

Five zinc die castings are used in this piece of equipment, each one carefully designed to take advantage of the ability of the process to incorporate most, if not all, of the holes, bosses, mounting lugs, nozzles, etc., so that little or no machine work is needed prior to assembly of the castings into the finished appliance.

Designing die castings with this particular idea in mind is not new, of course, but is such an important feature of die casting that it cannot be repeated too often. The rough castings used in this sprinkler are shown in Figure 1. Examination of each of them shows how well the design has utilized the flexibility of the die casting process to eliminate machine operations.

Motor Housing These two parts are zinc die castings. The smaller of the two, (Figure 1a) is used in the as cast condition, except to drill out one bearing hole for the oscillating mechanism drive. The large hole at the top, in which the spray tube is mounted, serves as a packing retainer, the pressure of the water being adequate to seal the graphite packing sufficiently to prevent leakage. Screw holes are cored integrally with the counter-bores on the side not shown. The main shaft is pressed into a cored hole in the center of the casting. The knurling on this shaft is adequate to hold it in firmly. Alignment is to a blind hole cored in the other half of the housing.

Three studs can be seen in this casting. These are used to mount the motor yoke. After the yoke is mounted, these studs are spun over to form an integral rivet.

The other half of the motor housing, while requiring some machine work, is equally well designed. Two holes, one for the filter chamber cap and one for the hose connector must be tapped and the water jet passage drilled.

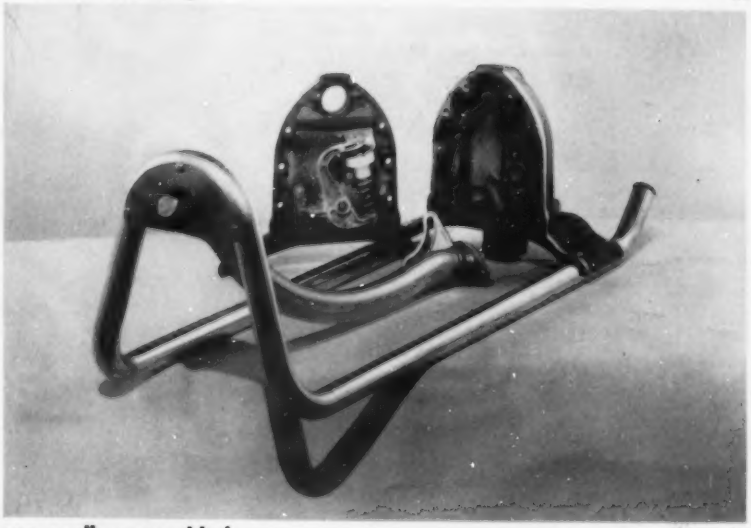
Since the joint between the two housing parts is gasketed, the surfaces may be used in the as cast condition and the use of self-tapping screws to fasten the two halves together eliminates tapping.

Motor Yoke Except for the impeller wheel with its associated worm gear, the entire motor assembly is held in alignment by this yoke, Figure 1c, which is a zinc die casting. Except for drilling one hole for a cotter pin, this part is used as-cast. As noted above, it is mounted onto the housing casting by integrally cast studs which accurately match the holes cored into the yoke casting.

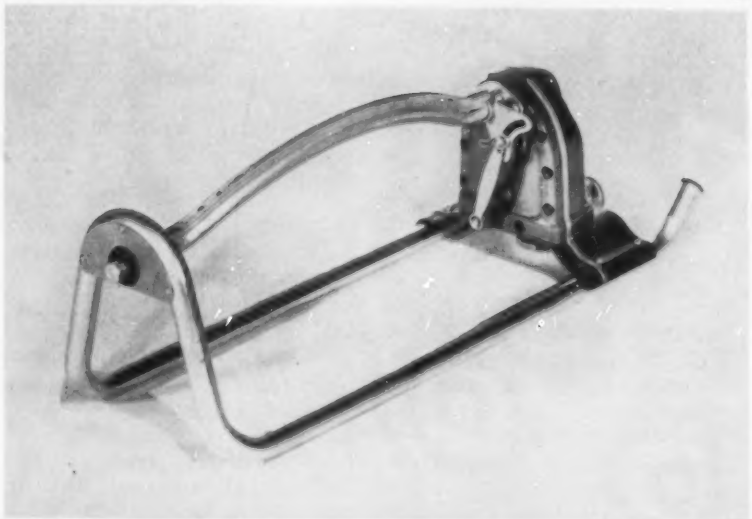
A water baffle must be used between the impeller and the motor and mountings for this baffle are cast onto the yoke. The assembly of the motor housing and the yoke is shown clearly in Figure 2 and in this figure the pins for mounting the water baffle are indicated.

Crank Arm & Rocker Arm. These two castings are also zinc. In the crank arm casting, Figure 1d, two cored holes

These die castings . . . 1.



are easily assembled . . 2.



into this lawn sprinkler . . . 3.

are provided, one for the drive shaft which is pressed in and the other for the connecting pin which fastens the crank arm to the connecting rod. Both of these castings, the crank arm and the rocker arm are ready for finishing as received from the fabricator.

Surface finishing on these zinc die castings is quite simple. The motor yoke requires no surface finish at all. The crank arm and rocker arm are both ball burnished. The two motor housing castings for the METCO Wave Sprinkler are phosphate coated and then coated with a baked enamel applied by semi-automatic spray equipment.

While all of the parts described were originally designed to be die castings, it is relatively easy to see how much greater the cost of the finished castings would be if the starting point were a green sand casting, the next best method of production. A further disadvantage to any other method of production would be the necessity of using some other metal than zinc with, probably, higher metal, founding and machining costs.

Melting and Marketing Discussed By Panel At ICI Spring Meeting

PANEL discussions on melting practices and on marketing will be among the features when the Investment Casting Institute meets at Cleveland's Hotel Carter on Thursday, May 6.

All members o fthe investment casting industry have been invited to attend the Spring meeting of the organization which, in its first year of existence, has undertaken several major projects of value to the investment casting industry.

Schedule of events announced by Harry Dolan, executive secretary of the ICI, includes a business session starting at 9:30 a.m. at which the Institute's program and plans will be reviewed. Reports will be heard from the Material Specification Committee and the Inspection and Standard Quality Practice Committee.

The morning session will also include a technical panel discussion of "Problems in Melting Techniques and Practices." A panel of experts including Dr. Nicholas Grant of Massachusetts Institute of Technology, will cover various phases of the melting operation.

The afternoon session will feature a panel on marketing and sales management for investment casting. It will be led by V. S. Lazzara of Casting Engineers, Inc., who is vice president of the Institute.

Also part of the proceedings will be a cocktail and dinner party at the Hotel Carter on the evening preceding the general sessions. All members of the industry have been invited to attend. The cocktail party is set for 5:30 and the dinner for 7:15 p.m.

Surveys to Give Investment Casters the "Facts of Life"

TO establish their future activities upon the solid base of facts concerning their industry and its customers, the Investment Casting Institute is counting on the results of two surveys currently in progress.

One of these, sent out by the Institute to all known investment casting foundries, is a questionnaire, drawn up by five experts in the investment casting industry, to indicate such data as relative volume of metals cast, types of products in which investment castings are being used, size and range of equipment of investment casting foundries, inspection methods, etc.

The second survey is being conducted by PRECISION METAL MOLDING magazine in association with the Institute to determine the factors which presently influence buying of investment castings and potential markets.

TECHNICAL CONSULTANT NAMED BY INSTITUTE

All members of the Investment Casting Institute will now have the opportunity of submitting questions and problems on metallurgy and precision casting, for answer by

Dr. N. J. Grant

a noted authority in the field. Kenneth M. Bartlett, Thompson Products, Inc., president of I. C. I. has announced that Dr. Nicholas J. Grant, associate professor of metallurgy at Massachusetts Institute of Technology, will act as technical consultant.

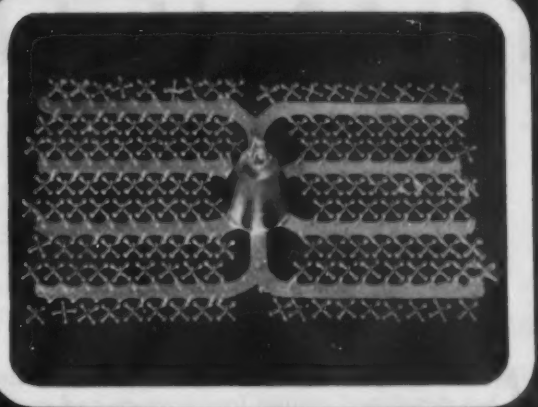
Dr. Grant has published many papers in the field of physical chemistry of steelmaking, and in the field of general high temperature metallurgy. He has published several papers on precision casting specifically, and his utilized precision casting as a research tool extensively throughout his high temperature metallurgical research. Dr. Grant has been engaged in such precision casting research at M. I. T. since 1940.

Dr. Grant studied metallurgy at the Carnegie Institute of Technology where he graduated in 1938, after which he worked at the Bethlehem Steel Co. as an open hearth metallurgist.

In October 1940, he entered MIT to study for his doctorate in metallurgy, which he received in 1944. During the period from 1941-1945, he was associated with the research programs at MIT. He became an assistant professor in 1944, and is now an associate professor working both in the field of physical chemistry of steelmaking and in high temperature behavior of metals.

telling the story of 'dag' dispersions

Die Sticking Prevented by Dry-Film Lubricants



Try 'dag' Colloidal Graphite as a die lubricant. Here's why it's so good:

It's slick as a whistle, wholly unaffected by heat up to 750°F., and is easy to apply. 'dag' dispersions can be sprayed or painted on your dies, or put on by dipping.

Dies treated this way with 'dag' Colloidal Graphite take on a *dry lubricating film* that eliminates sticking, improves finish, and reduces carbon build-up in die impressions.

It lubricates ejector pins and plungers, too, so they won't stick or jam. Try a 'dag' dispersion and see! More details are yours by asking for Reprint DC and Bulletin No. 426-E.

Dispersions of molybdenum disulfide are available in various carriers.

We are also equipped to do custom dispersing of solids in a wide variety of vehicles.

dag DISPERSIONS

Acheson Colloids Company, Port Huron, Mich.

...also ACHESON COLLOIDS LIMITED, LONDON, ENGLAND

try resin-bonded dry graphite films for permanent lubrication

Part One

In this report, originally written as a series of letters from a foundry executive to his customers, the buyer of castings is informed what to expect from shell mold castings "Don't look for complete elimination of machining," he advises, pointing out 11 other advantages. Also included is a report on some of the materials, equipment and methods used.

Take A Good Look At Shell Mold Casting

BY WILLIAM S. THOMAS, Vice President
Emmaus Foundry and Machine Co., Inc.

IT would seem that a lot of misunderstanding and confusion has developed among foundrymen and casting users regarding the new shell molding process of casting production.

Being present at a number of demonstrations, talking to foundrymen and manufacturers and listening to their comments, we have come to the conclusion that unless we get straightened out we are going to have another situation such as developed a few years ago when ductile iron came to the attention of our foundrymen.

It wasn't long before all kinds of wild statements were being made such as, "It will replace malleable iron" and "All castings will be made with high test features." Of course most of these statements were made by people who were not entirely familiar with the process and the hazards involved. But in many instances it did give ductile iron a bad reputation because some foundries made rash claims and were unable to produce. This situation still remains and it is going to take a lot of educating to rebuild the confidence of many casting users that there is merit in ductile iron when properly made and applied.

The same situation is here in connection with shell molded castings. Claims are being made regarding the elimination of machine operations, holding casting tolerances to .002 and .003 and many casting users are going overboard in designing parts with machining eliminated.

There is no question that some of the larger foundries with the latest in equipment and technical personnel will be able to produce shell molded castings to accuracies unheard of, but this certainly does not apply to the average jobbing foundry. It is not as easy as it looks on the surface and many foundries do not have the know-how to get into it profitably, and can do more harm than good in getting into it at all, under the assumption that the elimination of machine operations is the prime requirement.

In our estimation shell molding is the greatest advance to casting manufacture that has come along in many years, and it offers many advantages to the casting user over conventional sand castings.

Let us forget for the time being the matter of eliminating machine operations and tolerances of .002 and .003 and look into all of the many other advantages that shell molded castings can offer from the users standpoint.

1. Castings can be produced with a surface finish far superior to any other similarly made sand castings.

2. Reproduction of pattern detail brought out to the highest degree, castings can be produced with clean knife edges, and not the so called saw tooth so prevalent in sand castings.

3. With shrinkage properly allowed for, castings are closer to size of pattern than in any other sand method. There are no swells or pack-offs.

4. No appreciable "skin" effect results in better machinability with any metal. A machine cut as light as 1/64" can be made on shell molded castings with no detrimental effect on tool life.

5. Savings in the weight of the rough casting up to 20%, due to the reduction of finish allowed.

6. Savings in machining labor, using current tools due to less metal to be removed up to 25%.

From the foundry or casting view point, the advantages are as follows:

1. Up to 30% less metal required per mold.

2. Up to 45% less metal used in gates and sprues.

3. Up to 30% less cleaning and grinding cost.

4. Molding labor, as such, is reduced as much as 50%.

5. Cost per pound is actually less than in conventional sand molded castings.

The fifth and last statement may need some explanation, but after a year and a half of producing shell molded castings we are convinced that they can be produced at the same price and in with some designs cheaper than the regular sand casting.

There is of course one item of expense to the user that is higher than for conventional molded sand castings and that is the pattern equipment. The old maxim still stands and that is, the castings are only as good as the pattern, so that if castings with the qualities above enumerated are to be produced, suitable equipment must be used and this accuracy required in equipment will cost more.

If foundrymen will therefore forget the elimination of machining operations, with tolerances of .002 and .003, in their selling and offer the advantages listed above we are sure it will be sufficient to induce many users to give serious consideration to the many other advantages of shell molded castings.

Materials Used

THE shell molding process can safely be considered one of the major advancements in the foundry industry to date. The process was first put to use in Germany early in 1947 by Johannes Croning

continued on page 101

SHELL MOLD CASTINGS

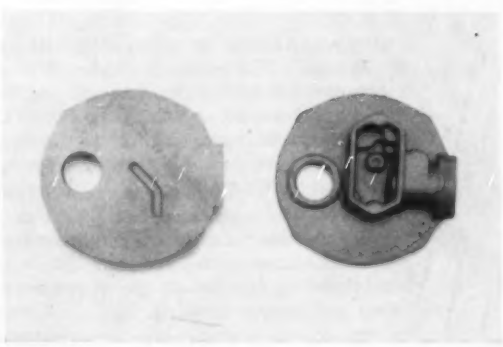
For the buyer 6 advantages over sand castings

- Superior Surface Finish •
- Better Detail •
- Closer to Pattern Size •
- Better Machinability •
- Weight Saving •
- Less Machining •

For the foundry 5 advantages over sand castings

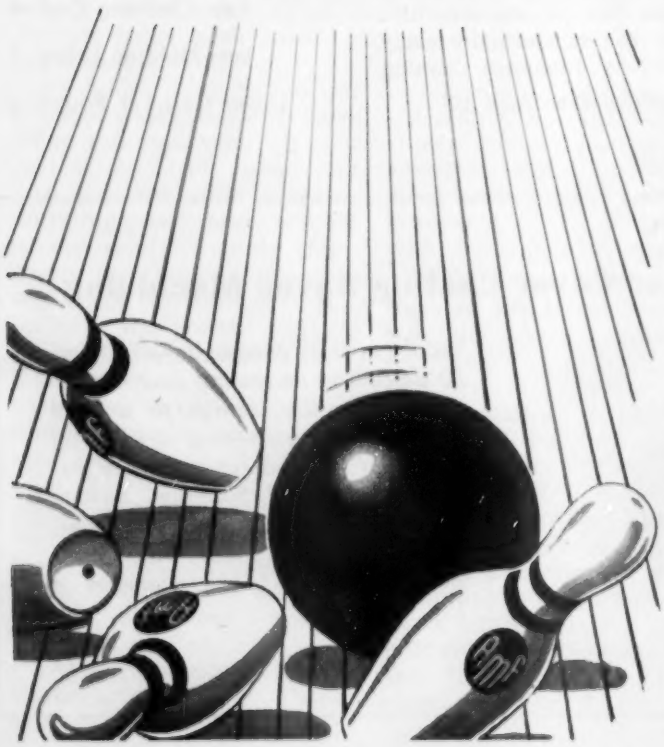
- Less Metal Per Mold •
- Less Metal in Gates •
- Less Cleaning Cost •
- Less Molding Labor •
- Lower Cost Per Pound •

Shell Mold Oil Lubricator Cover Casting Saves Machining



Reduction of 30 percent in weight and 70 percent in machining time has resulted from the change to a shell mold casting, permitting a grinding operation in place of the more expensive milling. Superior surface finish has been attained and tolerances are within .005. Casting dimensions are 5-1/16" diameter x 1⅜" high.

How Doehler-Jarvis is helping AMF



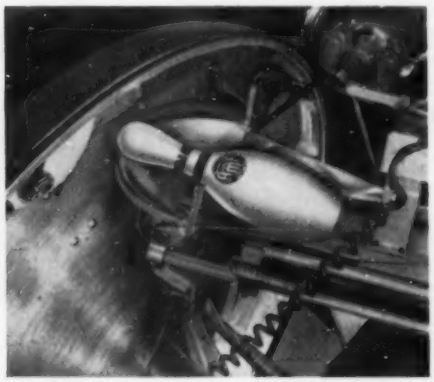
story of AMF's unique Automatic Pinspotter and the 99 Doehler-Jarvis die castings that make it economically practical.

Crac . . . ck! Your pins fly . . . all but four!

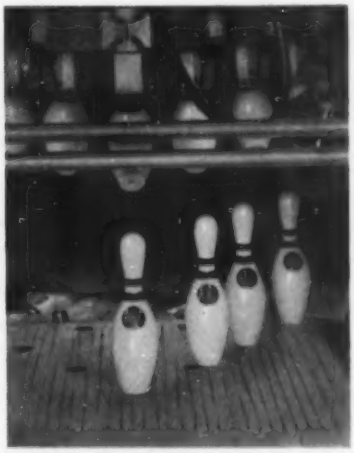
Woosh! The pinspotter goes into action, the instant your ball hits the pit . . . to lift the four standing pins, sweep deadwood into the pit, return the ball to you, and re-set the four standees *exactly* where your first ball left them.

Crac . . . ck! Your second ball hits to give you your 10th frame spare, extra ball, and then the game. As the pinspotter spots a new set of pins, you take time out for refreshment . . . and a look behind the scenes at the marvelous machine that automates bowling.

This unique pinspotter practically thinks for itself, adjusts to all the variables of the game and bowler. It is simple, as fast as the bowler, precise, and unbelievably reliable.



"Pinwheel" lifts pins from pit to distributor which delivers them into die cast spotting cups (left). Other Doehler-Jarvis castings are used to guide rods that clamp pins to "pinwheel" and to mount distributor head (above).



Standing pins moved off spot by first ball, must be held above pin deck for return to same position for second ball while deadwood is swept away. How the pinspotter accomplishes this is shown below.

Sponge rubber pad, supported in a Doehler-Jarvis die casting, locates the "off-spot" pin, grasps it, lifts it, and puts it down exactly where it was before, thus conforming with one of the game's most rigid rules.

automate bowling...

It could be prohibitively expensive . . . A production man's nightmare.

But American Machine & Foundry Company found ways to keep costs down. Right at the start they brought Doehler-Jarvis into the picture.

Together, engineers from both companies went over the prototype piece-by-piece, operation-by-operation... looking for the best ways to keep machining and weight down, precision and durability up.

The result of these meetings of minds? Doehler-Jarvis is die-casting 99 parts for the pinspotter. At AMF's plant, a hole may be tapped or a light finish cut made . . . but the bulk of the machining and a good deal of expense is avoided. As one AMF engineer puts it, "anytime you can eliminate machining today, you're certainly saving money."

Cutting costs for customers, big and little, is a Doehler-Jarvis specialty. Some of the best-known makers of automotive, electrical, communication, household, and office equipment count on Doehler-Jarvis to help them take full advantage of the die casting process.

You can count on Doehler-Jarvis, too...to apply to your problem the savvy in die design and parts production developed in our 50 years in this business. Call us in early in the planning stage.

Doehler-Jarvis Division

of

National Lead Company

General Offices: Toledo 1, Ohio

*Reg. U. S. Pat. Off.

For additional information Circle No. 17 on the Reader Service Card

What About The Army's Powdered Iron Rotating Bands?

- Do they meet specifications?
- Is there enough iron powder for the job?
- Are the assembly and machining problems solved?
- Have the bands been tested?

To find the answers to these questions, the editors of PMM asked A. J. Langhammer, chairman of the American Ordnance Association's Powder Metallurgy Committee. His comments are presented here.

Specifications

AN excellent set of specifications has been developed by the cooperation of Ordnance officials at the Pentagon, Frankford Arsenal, Picatinny Arsenal, the American Ordnance Association, and its powder metallurgy committee. The committee is comprised of 37 members including top ranking engineers, specialists, and management officials of both the metal powder producers and the parts manufacturers.

Iron Powder

Through research and development the original specifications have been improved steadily, particularly with regard to **increased requirements of physical properties, notably ductility.**

It has been estimated that for the iron powder rotating band alone, a minimum of 6,000,000 pounds of iron powder would be required per month during a grim period. When the powder metallurgy committee was formed, the total American output of iron powder was of the order of 600,000 pounds per month.

American iron powder producers have made iron powder available not only in sufficient quantity, but also with regard to required quality. Whereas some differences exist in the properties of the iron powder produced by various manufacturers, all of them have devoted a great deal of time, effort and money in the perfection of their process to meet U. S. Ordnance specifications of iron powder for rotating bands. Of the group, one company only has as yet not met the specifications.

Old line manufacturers of iron powder have expanded their facilities, and new producers, too, have come into the picture.

The question might well be raised, "Just how good is this iron powder?" First of all, it is vastly superior to anything that the Germans employed during World War II or have at the present. The technique of band manufacture likewise made great strides.

Hence, the requirements of the original U. S. Ordnance specifications were increased. This is particularly true with regard to the factor of ductility. The Germans had a specification of 2 percent elongation of ductility which, from case histories and technical reports, was rarely met. By comparison, the present U. S. Ordnance specifications call for a minimum ductility of 3 percent.

Assembly and Machining

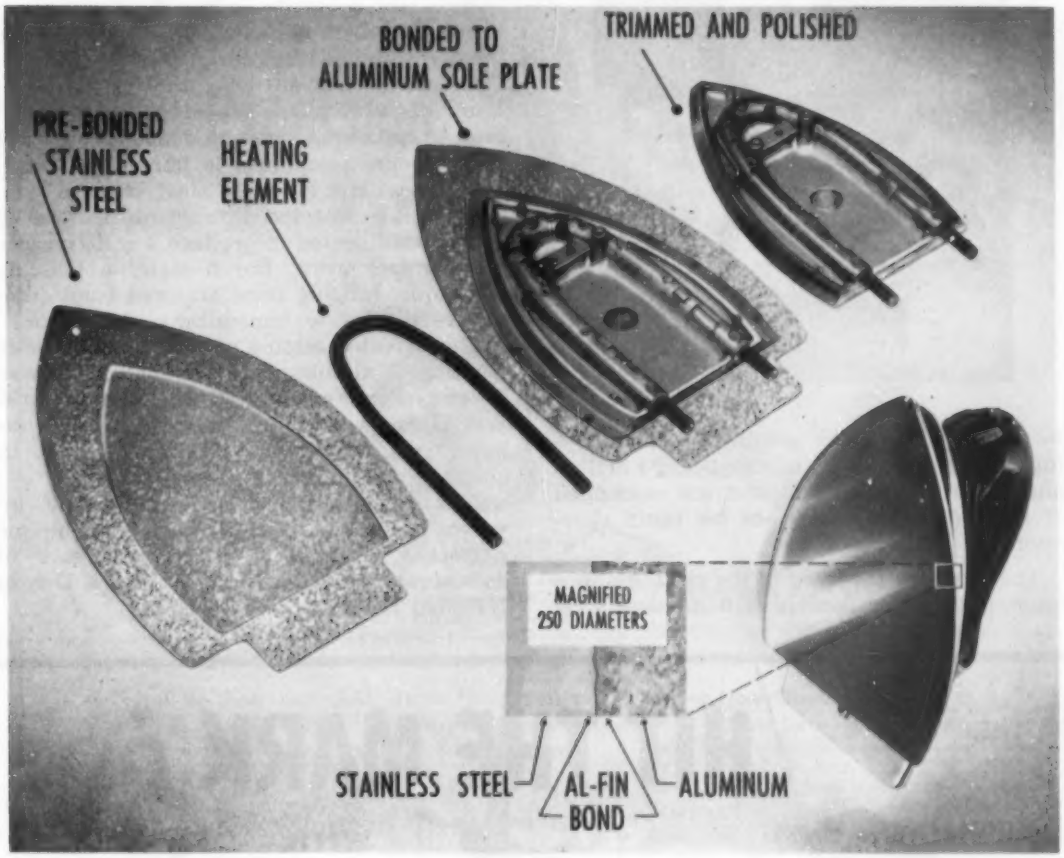
The manufacture of iron powder rotating bands requires special procedures. It cannot be treated as a run-of mine job, the principal reason being that whereas the nominal tensile strength, for example, is of normal value, it is actually appreciably higher because it applies to a product of lower density. Specified physical properties must be obtained at a density lower than normal.

The band assembly operation, too, had to be developed. Today assembly is carried out by two methods. One is the so called tapered die method where assembly is effected by forcing the shell, with the band properly located, through the die to seat the band. The other method employs a multi-jaw, tire setter type of machine where the entire mechanism, particularly the jaws and their actuation, are of a precision nature.

Machining of the band, while initially troublesome, was quickly put on a production basis. The powder metallurgy committee developed the design of cutting tool, (tungsten carbide tipped) with regard to shape, cutting angles, clearance angles, cut-

continued on page 70

From Automotive Pistons to Cooking Ware . . .



. . . They're Using A New Method To Bond Steel To Aluminum

THE hardness of steel and the lightness of of aluminum are combined in a new pressing iron development announced by the Al-Fin Division of the Fairchild Engine and Airplane Corp.

A thin layer of stainless steel — barely twice the thickness of a razor blade and weighing less than .08 lb. — is metallurgically bonded by the Al-Fin process to the bottom of a conventional die cast aluminum soleplate.

The result is a hard, durable pressing surface that can be polished to a gleaming finish.

Special quick-bond reactivation methods are employed which are highly adaptable to

mass production. The stainless steel stampings are pre-bonded by immersion in a molten aluminum bonding bath, and are stockpiled at the die casting machines for rapid operation.

The pressure involved in die casting aluminum, flattens the flexible .010 stainless steel sheet so that it conforms to the contour of the die casting die in which it is retained.

The stainless steel surface does not corrode or discolor when exposed to the moisture encountered in steam iron application, a condition common to the use of an all-aluminum soleplate. Starch pickup on the relatively porous cast soleplate causes discoloration or stickiness which is reportedly avoided by the bonded stainless steel surface.

Occasional sub-surface porosity of aluminum die cast plates which may be uncovered by polishing, thereby causing rejects of conventional soleplates, is immaterial when covered with a stainless steel bottom.

Companies located throughout the world have been licensed to produce a wide variety of products using the bi-metallic bonding technique, ranging from armored band automotive pistons to bimetallic cookingware.

The patented casting process for molecular bonding of aluminum to ferrous metals was developed by Fairchild at the start of World War II and was widely used to bond aluminum cooling fins to steel cylinder barrels in air-cooled aircraft engines.

Al-Fin's pressing iron development involves a unique manufacturing technique perfected by Al-Fin after two years of collaboration with the Doehler-Jarvis Div. of National Lead Co.

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"DEPENDABLE SERVICE SINCE 1922"

How Inco Precision Casting cuts costs

30%
HERE

American Machine and Metals, Inc., of Sellersville, Pa., manufactures the AutoBAR liquor dispensing system. This collet head is part of the locking mechanism.

15%
HERE

This collet spreader is used to lock the assembly in the neck of the bottle. Both parts shown above are twice life-size.

Look at these two small parts. Important to the AutoBAR liquor dispensing system, they are precision investment cast. But this wasn't always so —

When the collet head was machined from Inconel® bar stock it required ten costly operations — and about half the bar was machined away as scrap. Now Inco precision cast, it needs only lapping and drilling of one hole — cutting cost 30%!

And the collet spreader, when machined from bar stock, required three parts which had to be brazed together. It is now precision cast in one piece requiring only drilling and lapping one hole — cost is cut 15%.

On both parts a tolerance of plus or minus .003 inch per linear inch was held! (Unusually close tolerances such as this frequently can be held on certain small parts by Inco precision casting specialists.)

All metal parts that come in contact with the liquor are made of Inconel or "K"® Monel to protect color and flavor.

To See How Others Have Cut Costs
Write to Inco for a copy of "A Machinist's Nightmare Becomes a Designer's Dream."

Can You Cut Costs with Inco Precision Castings?
Whenever you have a part which is 6 inches x 5 inches or smaller, weighs under 3 lbs., requires starting tolerances as close as plus or minus .005 inch per linear inch, and needs 5 or more fabrication steps, there's a good chance you can save by having it precision cast.

What Alloys Can Be Precision Cast?
You may obtain precision castings from Inco in many metals and alloys, from plain carbon steel to the new super alloys. And no matter what metal you specify, you get many advantages.

5 Advantages of Inco Precision Castings

Save up to 60% of production costs.
Longer life with harder alloys.
Little or no machining required.
Wider design latitude.
Higher alloys at lower cost.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street New York 5, N. Y.

Inco Castings INCO TRADE MARK

PRECISION, SAND, CENTRIFUGAL

For additional information Circle No. 34 on the Reader Service Card

Powdered Iron Cores of Today

BY JOHN C. WEBB, President,
Magnetic Core Corp.

POWDERED iron cores have come of age, today they find their way into television and broadcast receivers manufactured in this country. They also play an important part in many other electronic devices, such as short wave transmitters, frequency modulation equipment, aircraft and ship direction finders, radar, and many forms of telephonic apparatus.

Magnetic iron cores are in no sense new. They have been in use in the United States since the early 1930's in the form of a fixed, or non-adjustable iron to increase the "Q" or quality factor of a radio receiver.

The first serious attempt to manufacture cores for use at radio frequencies was the introduction of Ferrocast in Germany some twenty years ago. It was made by depositing a layer of insulated iron powder on to paper which was then rolled into tubes for use as plug cores, or a number of layers were formed into a block before being machined to a suitable shape. This material had a comparatively low permeability, less than ten in toroidal form.

It was not until World War II that powdered iron cores came into wide usage due to the demands of the Signal Corps for stability in communication receivers. Iron cores are not as simple a structure as their appearance might lead one to believe. There are close to one thousand variables in the process of manufacturing iron cores.

There are five basic types of powder in the majority of cores today. They are hydrogen reduced iron powder, magnetite, electrolytic iron powder, carbonyl iron powder, and synthetic iron oxides. Each has its own place in the industry for reasons of cost and performance.

continued on page 88

Designers of miniature electronic units want 4 improvements:

AS we enter into an era of miniaturization of electric components much work is to be done by the core industry. With the advent of the transistor comes the need for miniature coils and transformers but when size is reduced the temperature rise within the equipment becomes very high. It is therefore apparent that the manufacturers of electronic equipment will need the following improvements in iron cores.

- Higher permeabilities, which obviously would allow great reduction in physical size of components, new types and configurations that will allow the full use of the inherent permeability of the iron core.
- Higher temperature stability is needed up to a possible 300 C with perhaps the addition of a negative temperature coefficient powder to compensate those in use today.
- Different types of binders that can easily adjust themselves to these temperature ranges. This also will hold true for cores to remain stable under relatively humid conditions.
- New types of materials for the higher frequencies where the losses of the core would counter-balance the increased inductance of the coil caused by the permeability of the core.

To take full advantage of **DIE-CASTING** utilize

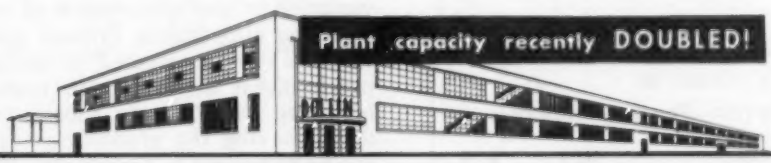
DOLLIN's *Specialized* DEPARTMENTS

LARGE CASTINGS DEPARTMENT

Aluminum die-castings of all shapes and sizes made on large cold chamber type, high pressure machines . . . large zinc die-castings on large plunger type machines. Equipment is the most modern available . . . much of it adapted by Dollin for greater productivity and efficiency. Write for *General Facilities Bulletin*.

SMALL CASTINGS DEPARTMENT

Small zinc die-castings—1000 per lb. to 3 per lb. —produced at *high speed* on *fully automatic* machines. Production rates comparable to screw machines, stamping presses, etc., with the design latitude of die-casting. Cut piece costs . . . consolidate parts . . . reduce machining, assembly costs. Write for *Small Parts Bulletin and Samples*.



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For additional information Circle No. 18 on the Reader Service Card

A New, Prealloyed, Stainless Steel Powder

BY A. ADLER
Alloy Metal Powders, Inc.

A new prealloyed stainless steel powder is being produced in commercial quantities, having properties similar to the more conventional forms of stainless steel sheet and bar stock.

The process of manufacturing this stainless powder lends itself to the production of the standard 18-8, the stabilized, and the higher nickel stainless alloys. The ferritic chromium stainless types and certain high nickel alloys, such as Inconel, can also be produced by this method. Some of these available grades are: type 302, 304, 305, 310, 316, 321, 410 and 430.

A typical chemical analysis of types 302, 316 and 430 alloys are given in Table I.

It will be noticed that the powders are truly prealloyed, in the respect that there are no additional percentages of each element added or subtracted, nor are new elements introduced into the alloy.

Process

The method of manufacture is basically a variation of the phenomena of intergranular attack of alloy steels. Pressed scrap, in billet form, is furnace-treated to produce carbide precipitation at the grain boundaries. The brittlized carbides are subsequently broken down leaving the granular component. This can be compared to a brick wall whose mortar has been chipped away, leaving the bricks to fall freely. Through the proper variations of this technique, it is possible to control the grain size of the resulting powder. From the same starting material granulars can be produced in the order of 100 percent of a + 10

Data for the Fabricators:

TABLE I
Typical Chemical Analysis

Element	302	316	430
Carbon	0.90%	0.08%	0.11%
Manganese	1.05	1.52	0.94
Phosphorus	0.003	0.010	0.021
Sulfur	0.011	0.007	0.016
Silicon	0.94	0.87	0.50
Chromium	18.4	16.9	15.2
Nickel	9.03	10.2	-
Molybdenum	-	2.17	-

TABLE II
Typical Screen Analysis*

Mesh Size**	302	316	430
100	0.0	0.0	0.0
—100 +150	0.5	6.5	6.0
—150 +200	7.5	32.3	10.3
—200 +270	15.0	27.6	24.2
—270 +325	22.0	20.9	27.5
—325	55.0	12.7	31.0

* All types of blend distributions are available starting from —20 mesh.

** All the above analyses produce tensile strength in excess of 65,000 psi.

TABLE III
Typical Physical Powder Properties

Property	302	316
Apparent Density, g/cc	3.41	3.50
Flow Rate, seconds Standard Flowmeter 39.4 sec./50 grams	18.6	20.1
Weight Loss in Hydrogen 2100° F for ½ hour	0.92	0.14

mesh powder, down to and including 100 percent of a — 325 mesh powder, or any percentage between the two limits.

The most effective blend for parts fabrication, and the one that has proved commercially acceptable, contains about 55 percent of the — 325 particles for the type 302 alloy and from between 55 and 12 percent of the — 325 mesh for the type 316 and 430 alloys. Other effective blends for certain applications are: — 20 to + 50 mesh and — 40 to to + 150 mesh granulars. The finer blend distributions have in some cases produced compacts witih tensile strengths in excess of 70,000 psi.

A typical screen analysis of these alloys are shown in Table II.

Operational Steps in Producing Parts

Some of the physical powder properties are:

1. The powder is exceedingly bright and irregularly shaped.
2. The material is easily compactable.
3. The particles are substantially free from surface oxidation.
4. The powder can readily be compacted at pressures as low as 30 tons per square inch.
5. Effective sintering temperatures start at 2100 F.

Other powder physical properties are given in Table III.

The particle size distribution (as given in Table II) is comparable to the conventional — 100 mesh iron powders commercially used in quantity.

Since stainless steel powder particles are somewhat harder than iron powder particles the material is normally less compressible than iron powder. Green compacts produced therefrom are somewhat weaker and of lower relative density than those of iron powder compacted at the same pressures. These differences are of no great magnitude. The powder can be readily molded at pressures of 30, 40 and 50 tsi.

Substantially all metal powder parts applications require additions of lubricants to the powder to aid the compaction phase of the part, to ejection it from the die and to minimize die wear. A volatile lubricant such as Sterotex[1] added in the amount of ½ percent has been found suitable for this particular stainless steel powder.

Parts made from the powder can be sintered at temperatures of the order of 2100 F to 2300 F. The higher temperature gives the higher tensile and elongation values; the lower temperature, while exhibiting somewhat lower strength and elongation, gives the least dimensional change. In all cases, shrinkage occurs. A study of the effect of time of sintering shows 1½ hours at temperature to be a practical duration which gives excellent properties. (Shorter sintering times, par-

continued next page

Data for the Designer:

TABLE IV

Typical Compact Properties*

CONDITIONS OF PREPARATION

Compacting Pressure	— as shown	Cooling Rate	— SLOW — ½ hr. to room temperature
Sintering Conditions			
Temperature	— as shown	Coining Pressure	— as shown
Time	— 1½ hours at temperature	Annealing Conditions	— same as for coining
Atmosphere	— dry hydrogen		

Compacted ton/in²	Coined ton/in²	Temp. °F	Green Dens. gm/cm³	Sint. Dens. gm/cm³	Coined Dens. gm/cm³	Comp. Ratio	Porosity*	Shrinkage	Tensile Str. #/in²	Elongation % in 1"	Rockwell
30	-	2100	5.55	5.79	-	1.23	15.2	0.90	29,000	9.0	H - 87
50	-	2100	6.04	6.23	-	1.88	15.6	0.80	42,500	14.0	B - 40
50	50	2100	6.04	6.23	6.89	2.45	13.6	0.70	60,000	20.0	B - 60
30	-	2200	5.55	5.79	-	1.23	14.4	1.02	31,000	10.0	H - 89
50	-	2200	6.04	6.40	-	1.88	14.7	1.01	49,000	15.0	B - 41
50	50	2200	6.04	6.40	6.89	2.45	13.0	1.00	63,000	21.0	B - 60
30	-	2300	5.55	6.05	-	1.45	14.1	1.22	38,000	12.0	H - 90
50	-	2300	6.04	6.60	-	1.99	13.9	1.12	53,000	16.0	B - 42
50	50	2300	6.04	6.60	7.00	2.51	12.3	1.10	67,000	25.0	B - 61

* Based on 302 and 316 alloys only
** Based on 18-8 stainless steel density of 7.74 g/cc

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Stainless Steel Powder, Cont.

ticularly those less than 45 minutes at temperature, produce appreciable diminution of physical properties. Longer sintering time produces relatively small improvement in physical properties.)

A sintering atmosphere of dry hydrogen should be used. Commercial cylinder hydrogen can be used provided it is properly deoxidized and dried. Deoxidation is accomplished by passing the hydrogen over palladinized alundum. The hydrogen is then dried in an activated alumina drier to a dew point of — 60 to — 90 F. A dry, deoxidized atmospher is extremely important to prevent formation of chromium oxides.

After the sintering cycle is completed, the compact thus produced must be slow cooled (one-half hour to reach room temperature) to prevent oxide formation and surface discoloration. *This slow cooling is very important.*

To secure close dimensional control and optimum tensile and elongation properties, the sintered stainless steel compacts can be coined (using the same pressure as that of the initial compaction) and then annealed in the same manner and under the same conditions of temperature, time, and atmosphere as used in the original sintering. The same precautions of dry, deoxidized hydrogen atmosphere and slow cooling must be used. Appreciable increase in tensile strength and elongation results from coining and annealing.

Dissociated ammonia has been suggested for sintering stainless steel parts. This atmosphere is extremely dry and produces a compact free from oxidation. However, while increases in tensile strength and hardness properties are obtained in comparison with the powder sintered under like conditions in dry hydrogen, appreciable decrease in elongation (representing loss of ductility) results. This decrease in elongation results from the nitriding effect of the dissociated atmosphere. A dissociated ammonia atmosphere is recommended *only* where maximum ductility is not required, or where surface hardness is required. Some effects of typical compact properties are given in Table IV.

Applications

The first applications for stainless steel powdered parts were small driving arms in water meters. The need for higher resistance to wear and corrosion were paramount factors in determining the basic metal components. Stainless steel powder proved quite effective, while at the same time reducing the cost per driving arm.

Drawn stainless tubing and bushings in

continued on page 80

Finishing Section

SURFACE FINISHING

Most precision metal molded parts receive some type of surface finish such as plating, organic coating, anodic coating, or chemical coating. This section includes information on the methods, processes and equipment used in these surface treatments.

A Section Devoted to Specialized Finishing of

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News about

COATINGS for METALS

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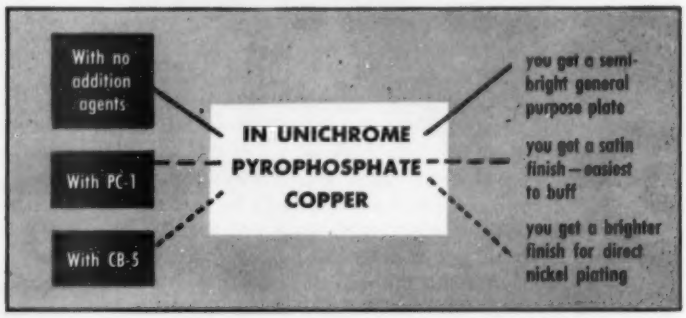
Copper Bath Now Gives Three Finishes


With no addition agents
With PC-1
With CB-5
IN UNICHROME PYROPHOSPHATE COPPER
you get a semi-bright general purpose plate
you get a satin finish—easiest to buff
you get a brighter finish for direct nickel plating

New addition agents for Unichrome Pyrophosphate Copper Plating Solution add extra benefits

AMAZING new versatility has been introduced into the Unichrome Pyrophosphate Copper Process by development of two new addition agents. Now, in addition to the time-tested semi-bright deposit, a still brighter or a satin finish can also be obtained. Platers can now choose a deposit that best fits the work to be plated, and thereby cut costs.

BUFFABILITY INCREASED

One of the new addition agents, Unichrome Compound PC-1, increases plating speed as much as 15 to 20%. The satin deposit it produces hides polishing marks on steel. This dense deposit "flows" under the buffing wheel at lighter pressure. Buffing this copper suffices in many cases, eliminating any need to do the harder buffing on subsequent plates.

BUFFING AVOIDED

Unichrome Compound CB-5, the other agent, serves to brighten the deposit. Producing a more uniform plate overall, it can generally eliminate need for copper buffing prior to plating with bright nickel. Even low current density recesses get increased brightness.

Increased plating speed has also been obtained in installations using this addition agent.

MORE COST CUTTING FEATURES

Whether used with either of the new agents, or simply used alone, the Unichrome Pyrophosphate Copper Process offers certain service-proved advantages that reduce plant operating costs.

As a cyanide-free bath, for example, it minimizes cyanide disposal expenses — which include *materials* to treat the wastes; also the cost of waste-treating *equipment*, the *space* it occupies, and the *labor* to operate and maintain it.

Other features insure simplified operation. It maintains its initial wide current density range. It permits simple, more efficient air agitation. It covers well without difficulty, and it is unusually easy to control. Send for new Bulletin CU-3 which gives more details.

HERE'S ECONOMY IN TEMPERATURE-CONTROL COILS

No common plating room acid, except hydrofluoric, can attack tantalum metal. Unichrome Tantalum Coils, therefore, offer a money-saving means for controlling the temperature of acid solutions such as chromium plating baths. A New England company that installed two of them discovered after only one year that the coils had actually paid for themselves by eliminating both the cost of repair or replacement of former type of coils, and the downtime and loss of production normally experienced.

Many chromium plating difficulties eliminated

Case after case has shown that the Unichrome SRHS Chromium Bath virtually obsoletes the ordinary solution. Here are its chief advantages:

Important chemical constituents of the Unichrome SRHS bath are controlled automatically — maintaining the solution at top plating balance. This has slashed control time and maintained plating quality.

Higher plating speeds have been achieved—with plating time often cut 50% or more, and capacity of existing equipment increased.

This solution's wider bright plate range has reduced "burning" on edges and "missing" in recesses, thereby further cutting rejects.

In hard chromium operations, its greater leveling action has reduced polishing time. Bulletin SRHS-2 gives more information.

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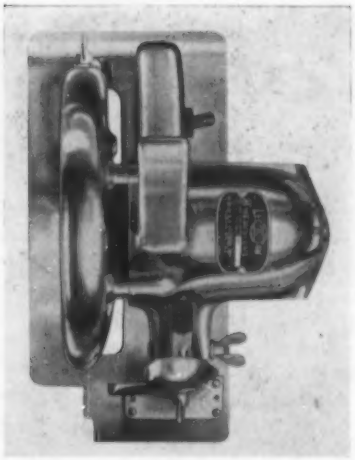
Complex Die Castings CAN Be Polished Automatically



1. SO SUCCESSFUL has been the polishing and buffing of the die cast housing for this portable saw on automatic machines, that 22 other die casting have since been put on automatic cycling.

AUTOMATIC polishing and buffing setups can save time, labor and money in the finishing of die castings in large quantities — when the shape of the castings is suitable.

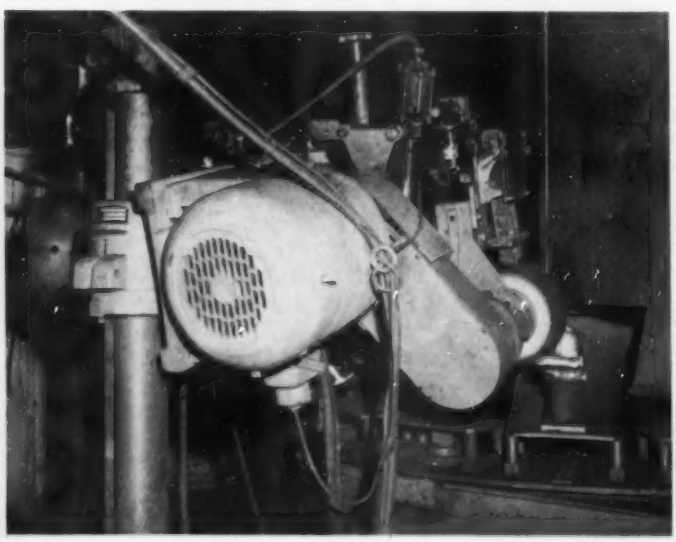
Usually this is thought to limit to simple contours the shapes that can be processed automatically. Long plane or crowned surfaces, easy curves or shallow concave areas can be finished with either straight line or rotary, multiple spindle automatics.

But at Black & Decker Manufacturing Co. in Towson, Md., the very complex shapes of die cast aluminum portable tool housings are being successfully buffed and colored on automatic equipment, followed by a small amount of touch up on manual setups for surfaces not reached automatically.

First die casting on which B & D worked out the "bugs" and perfected its automatic sequence was the housing for a portable saw, Figure 1, but since that, it has put 22 ad-

continued next page

2. SERIES OF BUFFS contact main surfaces as housing passes beneath them.



3. OPERATOR can start or stop each head, the entire table, or the spindles.

Pick the Polishing Machine and the Buffs for the Job

ditional aluminum die castings on an automatic cycle.

B & D makes nearly 150 different models of tools plus several thousand accessories. Tools that go into industrial applications do not require high surface finish, but the Utility line intended for hardware, department and specialty stores must have buffing and coloring. Due to the cost factor, it was determined that, if possible, many of these castings should be finished automatically.

The portable saw housing is one that seemed to defy automatic polishing, but in spite of "expert" opinion to the contrary, B & D plant men felt that a good part of this casting could be finished automatically. The casting which houses the 8-inch Heavy-Duty Utility saw, is about five inches in diameter and 6½ inches long.

First step was to find an automatic buffing machine big enough and rugged enough to buff the saw case. Company men made a tour of several buffing installations in the area. They then contacted Acme Manufacturing Company of Detroit who built a machine that is a redesign of one of the company's standard models. The new machine, Figure 2, besides doing continuous straight line buffing, also rotates intermittently. Experiments with spindle speeds and buff size were conducted to determine the best combination for each job. Ventilated buffs selected for the job are Hanson-Van Winkle Munning's Ruff-L-Buffs.

It was found that the saw case would have to be turned many ways to be completely buffed, and that consequently, several buffing heads were needed to do the job.

Procedure for finishing is as follows: An operator working at the machine's mouth advances castings from one jig to the next until they have been repositioned the required number of times to complete the buffing.

As the casting passes around the table, it comes in contact with each buff, held by a spindle under spring loading so that the buff rides the casting properly. The spindles are motor driven, and a ratchet mechanism feeds buffing compound automatically to each spinning buff.

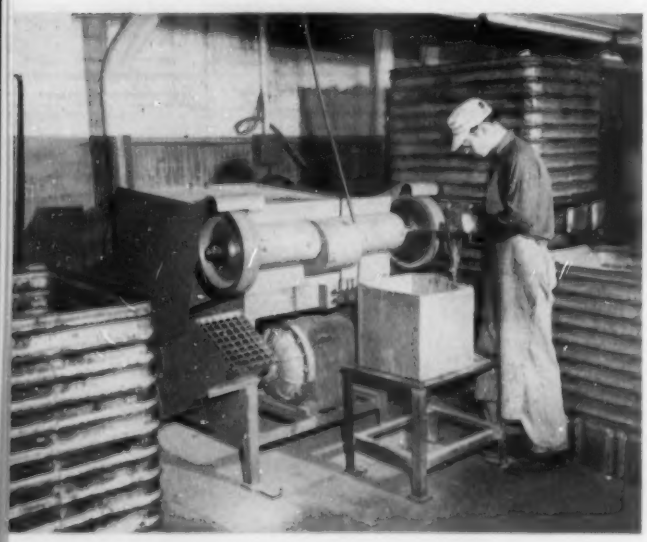
The operator of the machine works beside a panel board, Figure 3, and may start or stop each head, the table or the the spindles. He may also raise or lower the heads or stop the whole works.

One advantage of the setup is that the shop foreman can have the machine shut down and reset for other buffing jobs. Afterwards it can be reset precisely as before to finish saw cases.

It was also found that belt sanding would be desirable prior to buffing to remove heavy flash roots and parting lines. After checking with belt suppliers to collect information on rates, break-even point on the length of belt, types of belt, etc., the company set up a line of backstand belt stands, Figure 4, with grit and timing established for each operation.

After the saw cases are buffed on the automatic machine, it is finished off by hand buffing. For example, spots in and around the handle which could not be reached automatically, are taken care of manually.

4. BACKSTAND BELTS are used to remove parting lines and heavy roots before polishing.



5. MANUAL TOUCHUP is required to get into the few areas not buffed by the automatics.

After hand buffing, the castings are thoroughly cleaned. Parts are loaded in a basket and carried to the washer, where an operator loosens bolts on the saw handle before placing the castings on a belt conveyor feeding into the washer. At the far end of washer, another operator receives the washed castings, tightens the bolts, and places the castings in a mobile basket. Bolt loosening permits the alkali bath to remove grime caught in the opening. Castings are next heat-dried and any water trapped inside the castings is blown out by compressed air. Final step in the process is touch-up and coloring by manual buffing.

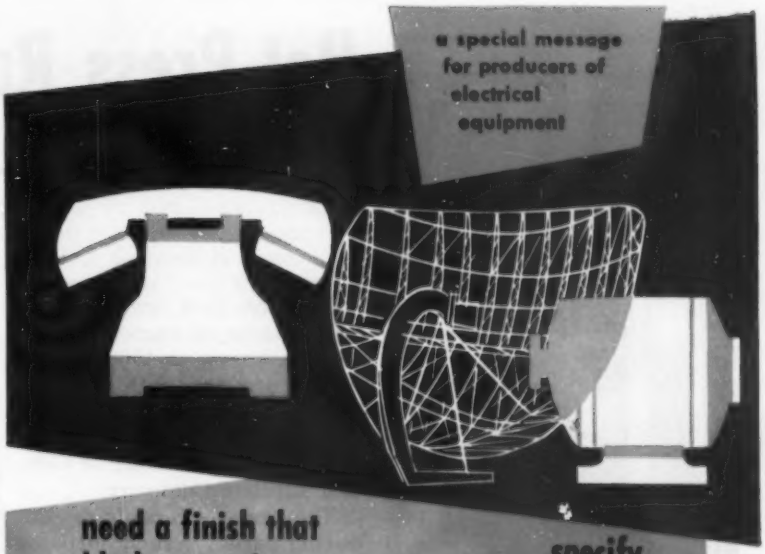
ELECTRONIC PLATING CAPACITY EXPANDED

American Electro Products, Inc., 1358 Thomaston Avenue, Waterbury, Conn., originator of the "Cantavone" electroplating processes and techniques, has completed construction of a wing which more than doubles the production capacity of its former plant. The new building features the latest equipment available in the electroplating industry.

Under the Cantavone processes, intricate precision components in the fields of electronics, radar and communications are electroplated in volume with precious or common metals at rigidly controlled tolerances and at lower cost than conventional methods.

CHICAGO OFFICE CHANGED

Surface Combustion Corp., of Toledo, Ohio announces the moving of their Chicago Industrial Furnace Division office from Room 1270, 122 So. Michigan to Park Ridge Federal Bank Building, 116 So. Prospect in Park Ridge, Ill. Personnel involved in the change are W. O. Owen, district manager, H. J. Gregg, C. E. Newman, W. M. Dempster and R. Daley.



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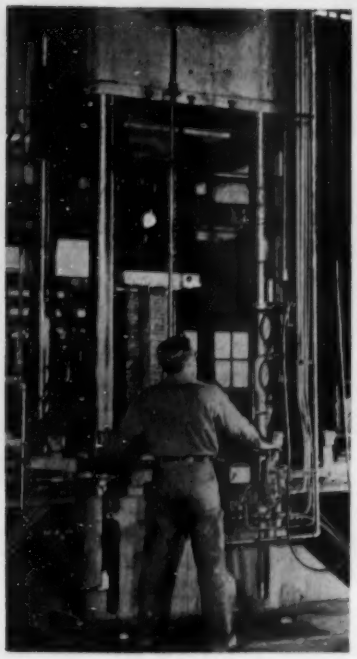


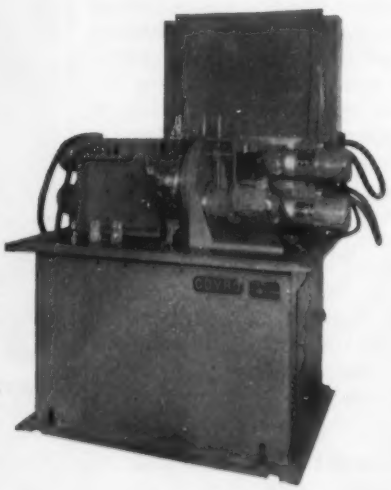
Hot Press Ready To Deliver 2-Ton Carbide

For the first time, single, solid pieces of cemented carbide as heavy as 4000 pounds can be produced in a new 220-ton hot press installed recently in the Detroit plant of Carboloy Department of General Electric Company.

The press is capable of producing parts for such purposes as large die sections, rolls for rolling steel strip, large punches for cold extrusion work, large wear resistant linings for brick molds and many other uses.

One of the largest of its type is the cemented carbide field, the 19-foot hydraulic unit is capable of compressing huge pieces of carbide ranging in size approximately 21 inches in diameter by 21 inches high, or 7 inches in diameter by 5 feet high, the dimensions of the piece being determined by the weight. It places Carboloy Department in a position to expand its market in supplying large cemented carbide pieces previously impossible to produce.

OPPOSED HOLES
Drilled and Reamed in Line



A way to drill and ream opposed holes in line at a greatly increased production rate has been developed in this new Govro-Nelson automatic indexing machine.

Incorporating a 6-station, Geneva-type indexing dial, electrically interlocked with 4 Govro-Nelson KH Automatic Drilling Units, the machine drills and reams 2 opposed holes in line (.156 diameter) in an automotive part.

The part is manually loaded and clamped, and is then automatically drilled, reamed, unclamped and ejected. Output rate: Aproximately 900 pieces per hour.

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Although larger size pieces can be processed, the present limiting factor is the size molds available. At present, the press uses the largest graphite extruded stock made which measures 36-inches in diameter.

Already in limited production, the huge press cuts hot press processing time by 50 percent, over the previous method used for smaller pieces. It also is capable of handling smaller pressings, such as conventional draw dies, capstan rings for wire, Hevimet counterweights and blanking dies at even less heating and pressing time.

Looking For New Uses

The pressing technique is so new that the full capacity of the press is not at present being used. Carboloy Department engineers, however, are surveying the field for other possible applications, both to keep the new press at full production capacity, and to provide users of such large parts, the full benefits of the new pressing technique.

The work is brought under the ram of the hot press by a traversing table that also doubles as a loading platform. The work itself, during the pressing phase, is heated by a huge heating furnace of a size suitable for the size mold positioned in the press. Heating temperatures range between 1300° to 1500° C. Several size heating furnaces are kept on hand to provide the most efficient heating possible to the work being compressed.

The whole hot pressing operation consists of preparing the graphite mold on the loading platform, loading the mold, inserting the proper pins & punches lowering the heating furnace over the mold, pressing, knocking out the work from the mold and sand blasting.

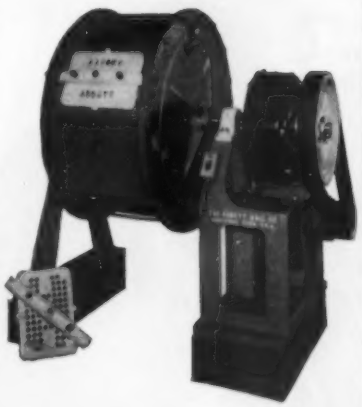
After the mold is positioned on the loading platform, the premixed and preweighed metal powders are poured into the mold. The powders, incidentally, are the same as those used in Carboloy's pill presses.

After the mold is filled, and the upper and lower punches are in position, the proper size heating furnace is then lowered over the mold by an overhead hoist. This whole procedure is carried on while a mold previously prepared is being pressed under the ram of the press.

When the press is ready for the new mold, the traversing table slides it into position, spotting the mold under the ram of the press. Once the new mold is spotted, the heating furnace is hooked up to the power source, and to the water connections, since it also is water cooled. Water connec-

continued next page

The ABBOTT METHOD



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2-TON CARBIDE — cont.

tions also are made to both the top and bottom plates of the press. These are copper plates 1 3/16 inch thick and about four feet square.

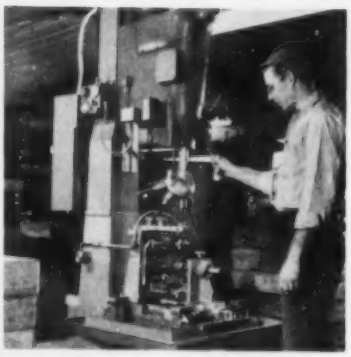
After all the connections are made, the press is actuated to begin its hot pressing cycle. Modern controls on the press coupled with more uniform heating from the heating source provide cemented carbide parts of the most uniform structure ever possible to produce by this method.

When the work goes through the proper pressing cycle, it is shifted from under table to the opposite side of the press, where the heating coil is removed and the mold picked-up by an overhead hoist and delivered to the knock-out room. Here, the cemented carbide piece is removed from the mold for cooling and then sand blasted. Silicon carbide is used for sand blasting.

The press itself is anchored in a conventional concrete base. Both the press motor and the required water pumps are all located out of the way on top of the press.

MULTIPLE DRILLING OPERATIONS

. . . with one machine & turret head



A new approach to drill press operation has resulted from the development of the turret drilling machine. With this drilling tool, one operator will perform up to six different drill press operations, including tapping, at a single location. Substantial savings are obtained in set-up time, drilling time, capital investment, plant space, handling and tool and fixture wear.

The drilling machine takes just 34" x 50" of floor space, the same as a conventional single spindle drill press. A six spindle turret is mounted on the single quill. Spindle speed, depth control, and automatic reversal (for tapping) can be individually pre-set for each spindle.

Only the spindle in use rotates, all the other tools point away from the operator. All operating and set-up controls are within easy reach of the normal operating position.

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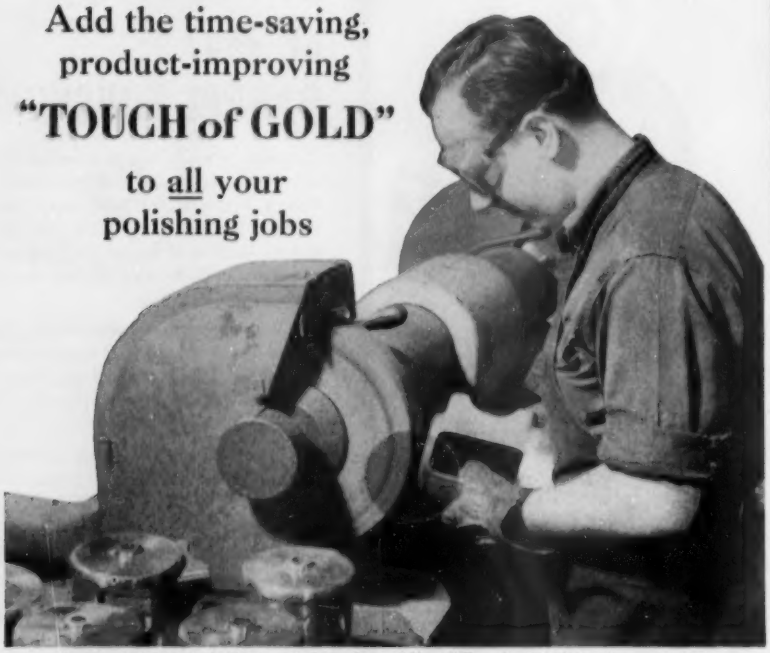

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Another reason is that ALUNDUM is specially processed to give it high capillarity. With *all* grains soaking up cement or glue uniformly and adequately, *each* grain is held firmly — assuring long-lasting, top-performing polishing wheels.

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mean better-finished, better-looking products in less time and for less money — the sure "Touch of Gold" you can add to all your set-ups, manual or automatic.

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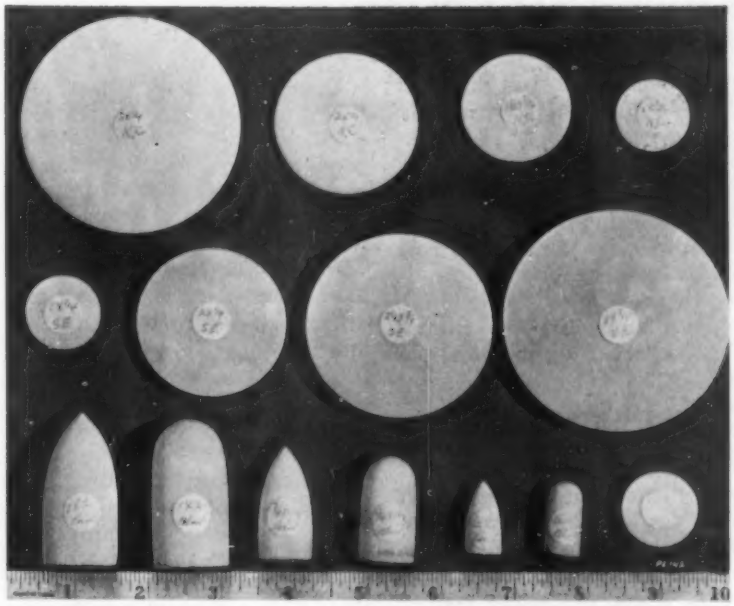

Your Choice Of Felts For Finishing Metal

KEEPING pace with metallurgical advances along a broad front, wool felt is being used more and more for finishing and polishing the newer industrial, as well as the older traditional, metals. Felt bobs and wheels in a full range of densities and hardnesses are aiding industry by making possible precision finishing, grinding, polishing and buffing operations in the metals industries.

Felt for such purposes must be specially engineered for the intended use. Aside from the important property of elasticity, felt can be coated with abrasive grains designed to do a specific finishing or polishing job. Wheels (6" and over) are tailor-made to rigid specifications in up to nine densities and are operated at speeds as high as 9,000 surface feet per minute.

For its part, the felt industry has developed, standardized, and is currently turning out in large numbers a wide range of felt bobs (wheels under 6" diameter) to meet the expanding demand for precision polishing operations.

For surface polishing, the job to be done determines the kind of felt called for. To polish copper plate for etching, for example, felt sheets are mounted on large cylinders. If the job involves finishing recesses in dies for drawing sheet metal, felt bobs are used. On the other hand, wheels made for rock-hard compressed felt are employed for polishing small diameters of metals prior to chrome plating.

In grinding, polishing, and buffing operations, felts are used in a number of ways.

- For polishing relatively soft materials, the horn-like character of the wool fiber itself makes it possible to favor the harder felts for polishing, with no additions or supporting agents.

- For polishing harder materials, felt wheels go to work in conjunction with other agents. In such applications, the felt wheels act as carriers for liquids in which abrasive substances are dispersed.

Actually, about 85 percent of felt wheels for surface polishing are what the industry calls "set-up" wheels, that is, wheels coated with glue and rolled in selected grits to form a somewhat permanent abrasive tool, similar in purpose and appearance to the familiar emery wheel.

Standard Felts Available

Mechanical sheet felts, a principal product of the industry, have been broken down into rigid specifications thus providing precisely standardized materials for metallurgical finishing and polishing operations. Felt manufacturers, through their organization, The Felt Association, have adopted standards for mechanical felts (accepted by and promulgated with the assistance of the Society of Automotive Engineers.)

These standards cover four classes of sheet felts: "Fine Spanish," "Spanish," "Fine Mexican," and "Coarse Mexican." The first two are finer types while the latter two are coarser fiber varieties. Each

continued next page

Prolong the life of your dies with PANGBORN HYDRO-FINISH®

Fine mesh abrasive suspended in water —that's how Pangborn Hydro-Finish precision cleans and finishes molds and dies. The result? Tolerances are held to .0001" and you get more years of service from your dies. In addition, Hydro-Finish eliminates further finishing operations by removing directional grinding lines . . . cleans off scale and discoloration in *minutes*.

For details on money-saving Hydro-Finish, send for Bulletin 1400A now! Write: PANGBORN CORP., 3500 Pangborn Blvd., Hagerstown, Md.

Pangborn

BLAST CLEANS CHEAPER
with the right equipment for every job

Pangborn's 50th Anniversary 1904-1954

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Picking the right felt for Metal Finishing

type is made in five different degrees of density: extra soft, soft, medium, hard, and rock-hard.

Standardized sheet felts are applicable to a wide range of technical uses. The extra soft Mexican type, for example, is used to polish aluminum, copper, zinc, and for wiping sheet steel during its manufacture.

At the other end of the density range, the extra hard Fine Spanish sheets are cut and turned into wheels and bobs for grinding and polishing metals and other materials, including dentures, glass tumblers, jewelry, leather, etc.

Sheet felts are usually produced in one-yard square pieces in a standard thickness range of one-quarter inch to three inches.

Deep drawing dies, combustion chambers for automotive engines, and such diverse products as lipstick holders and darning needles are given their final surface finish with felt bobs or wheels.

In polishing metal cylinders, to cite an example, felt strips are inserted in metal channels and the edge grain of the strip is used rather than the surface. A Spanish sheet felt is indicated for this job because it is hard, has plenty of life, and can readily hold grinding or polishing compounds.

For precision polishing of propeller blades an extra hard Mexican sheet felt is used as a base for carborundum abrasives.

Cutlery is polished by being placed between rotating felt rollers with fine pumice as the polishing medium. Spanish

WE OWN THIS QUARRY

The products of this Wisconsin quarry have been used for many years by a nationally prominent tumbling supplier, whose name will be furnished upon request.

CHIP SIZES

#1	1¼ to 1¾	#3½	½ to ⅝
#2	⅞ to 1¼	#4	⅜ to ½
#3	⅝ to ⅞	#5	⅛ to ⅜

Other sizes on request.

Processed Limestone and Granite Chips

FOR PRECISION TUMBLING

Other tumbling supply companies charge 15c a pound for these same chips. We charge only . . .

8c LB. Packed in 100 lb. bags. Prices f.o.b. quarry.

. . . because we sell direct from quarry to manufacturer.

X100 BURNISHING COMPOUND 20c LB.
(Other compound prices on request)

For years the products of this quarry have been used in processing parts for the majority of American manufacturers including:

FORD	GENERAL ELECTRIC	BORG-WARNER
GENERAL MOTORS	DE VILBISS	WHIRLPOOL
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BENDIX	AUTO-LITE	MINNEAPOLIS-HONEYWELL

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TWIN WHEELS are used here to polish a metal component.

sheet felt is favored because of the need for a hard felt which will deliver a scratch-free finish.

Chromium-Plated Parts — Chromium plated automobile parts, such as grilles, often become contaminated with body paint and require cleaning and polishing. Backcheck felt (this is a form of felt made up in roll goods rather than sheets) is ideal for such jobs because it is extra firm and lint-free, providing a scratch-free finish. It can be readily cleaned with solvents and re-used.

Backchecks also are used for wiping metal strips such as brass and steel, and for cleaning metals prior to plating (as in the silver plating of cutlery) where it is imperative that defects and surface contamination be removed before plating.

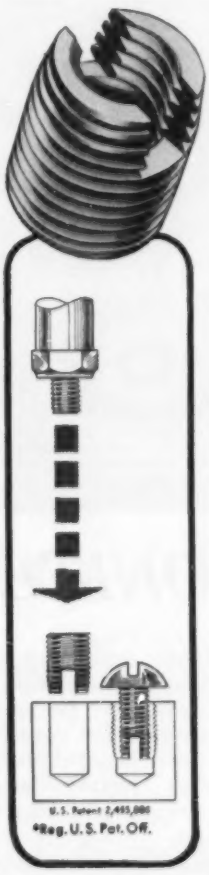
The aviation industry uses thousands of rock-hard, durable felt bobs for finishing engine parts, including connecting rods, cams, oil holes and other parts having irregular contours which a plain grinding wheel could not handle evenly.

Grinding and Polishing Aluminum — The aluminum industry uses a variety of mechanical finishes, either to

continued on page 70

THREADED FASTENERS

need a firm hold, too



Many modern structural materials require some sort of hard bushing to provide a firm hold for a threaded fastener. Among the bushings designed for this purpose, Tap-Lok* Inserts are notable for such distinct advantages as:

1. **No previous tapping or painstaking hole preparation needed.**
2. **Insert taps its own thread.**
3. **Impossible to cross threads.**
4. **No secondary operations required.**
5. **Easily installed with unskilled labor.**
6. **Insert immovable against vibration, has maximum torque-and-pull resistance.**

Tap-Lok Inserts are steel or brass bushings threaded externally to tap into drilled or cored holes equal in size to tap drill holes that will accommodate the external thread. Inserts are also threaded internally to receive male threaded member, and have slotted segments at one end for tapping the thread. A simple driving tool or a standard tapping attachment for a drill press are used for hand or production line installation.

Tap-Lok Inserts are used in large volume as original equipment, in production salvage, and in maintenance.

Send for descriptive folder

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Also manufacturers of Groov-Pins for positive locking press fit.

GROOV-PIN CORPORATION

1122 Hendricks Causeway **Ridgefield, New Jersey**

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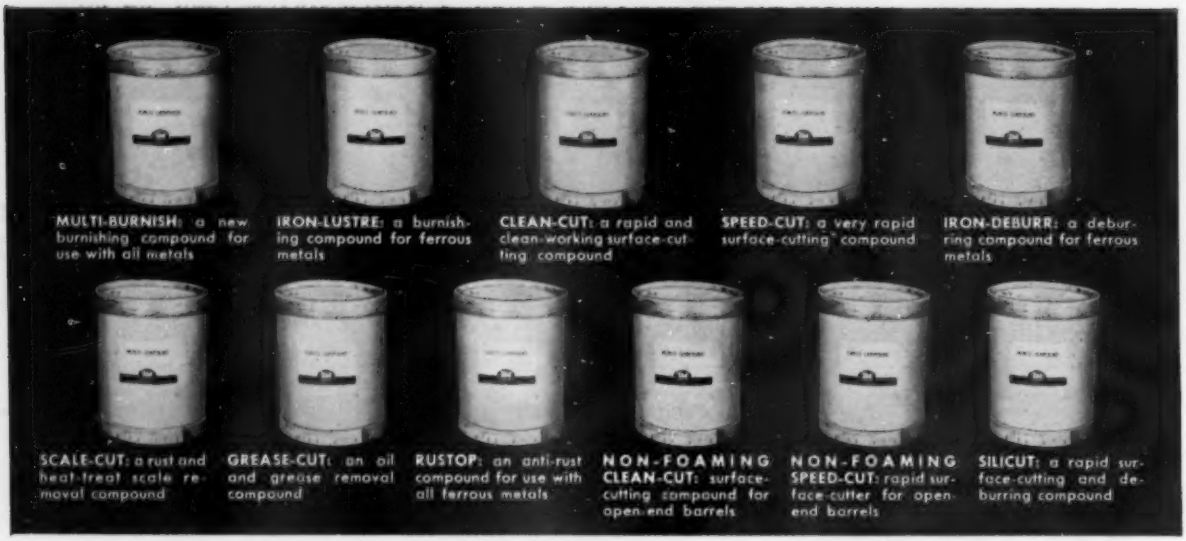
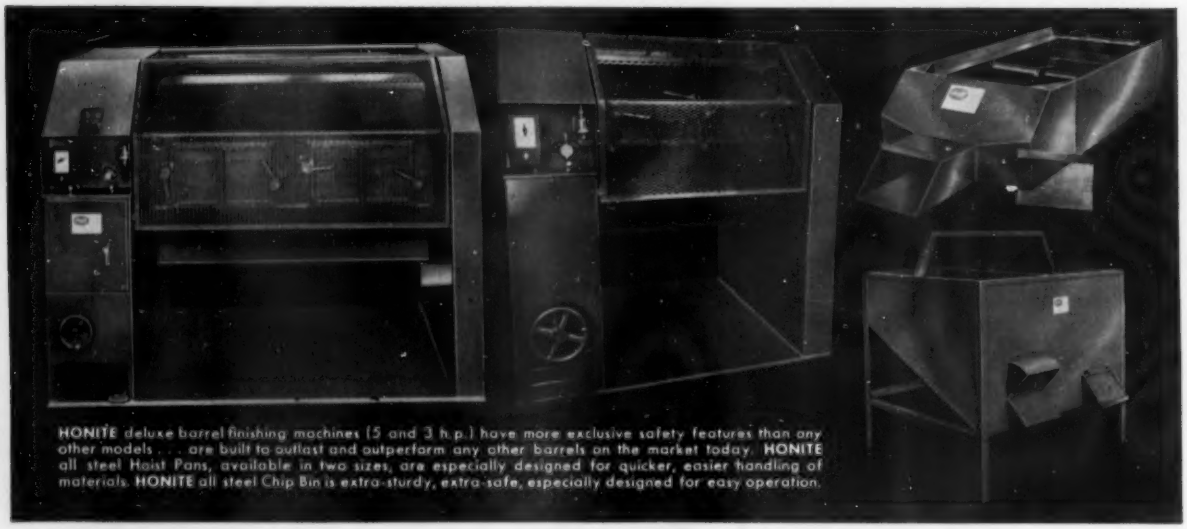

MULTI-BURNISH: a new burnishing compound for use with all metals
IRON-LUSTRE: a burnishing compound for ferrous metals
CLEAN-CUT: a rapid and clean-working surface-cutting compound
SPEED-CUT: a very rapid surface-cutting compound
IRON-DEBURR: a deburring compound for ferrous metals
SCALE-CUT: a rust and heat-treat scale removal compound
GREASE-CUT: an oil and grease removal compound
RUSTOP: an anti-rust compound for use with all ferrous metals
NON-FOAMING CLEAN-CUT: surface-cutting compound for open-end barrels
NON-FOAMING SPEED-CUT: rapid surface-cutter for open-end barrels
SILICUT: a rapid surface-cutting and deburring compound

There's a HONITE Compound...



HONITE deluxe barrel finishing machines (5 and 3 h.p.) have more exclusive safety features than any other models . . . are built to outlast and outperform any other barrels on the market today. **HONITE** all steel Hoist Pans, available in two sizes, are especially designed for quicker, easier handling of materials. **HONITE** all steel Chip Bin is extra-sturdy, extra-safe, especially designed for easy operation.

There's HONITE Equipment...

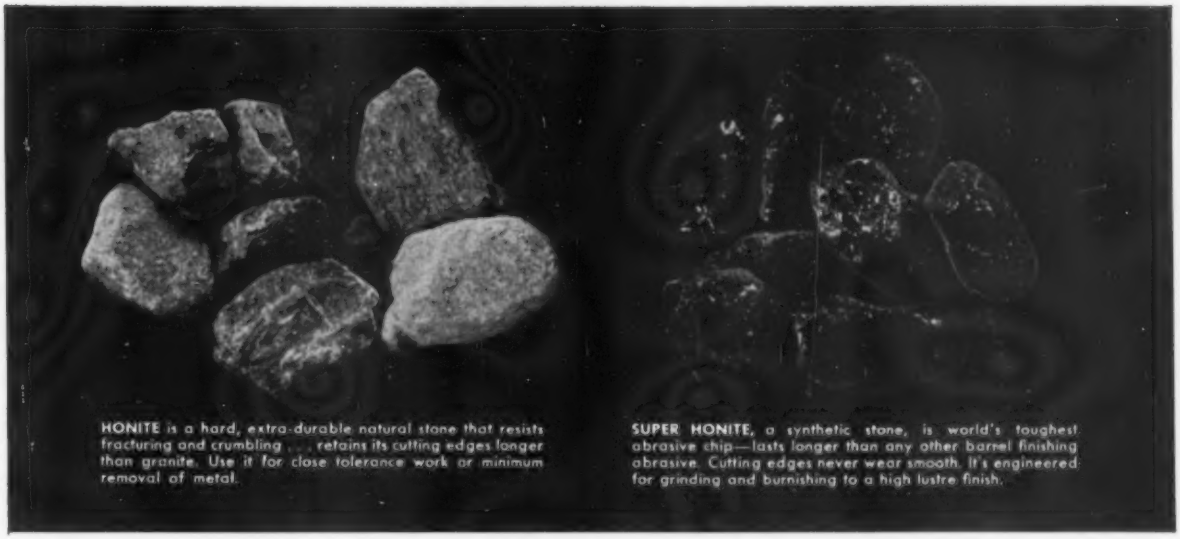
There's a Honite barrel finishing product for every barrel finishing need. Whether you now have barrel finishing equipment, or are contemplating an installation, you'll be money ahead with the Honite Method. Here's why:

Honite products are *engineered* to work together. Whether grinding, burnishing, deburring... they do better finishing at less cost. And, there's no guesswork involved . . . your Honite Sales Engineer or nearby Honite distributor is ready to help you select the *right* Honite equipment, the *right* size Honite chip and the *right* Honite compound to do the best possible work for you.

Let your Honite Sales Engineer demonstrate Honite Products to you, show you how the Honite Method can finish to micro-inch surface tolerances *and* cut your costs per finished unit.

Use the coupon at right for immediate attention, and a copy of "Barrel Finishing Manual." There's no charge or obligation.

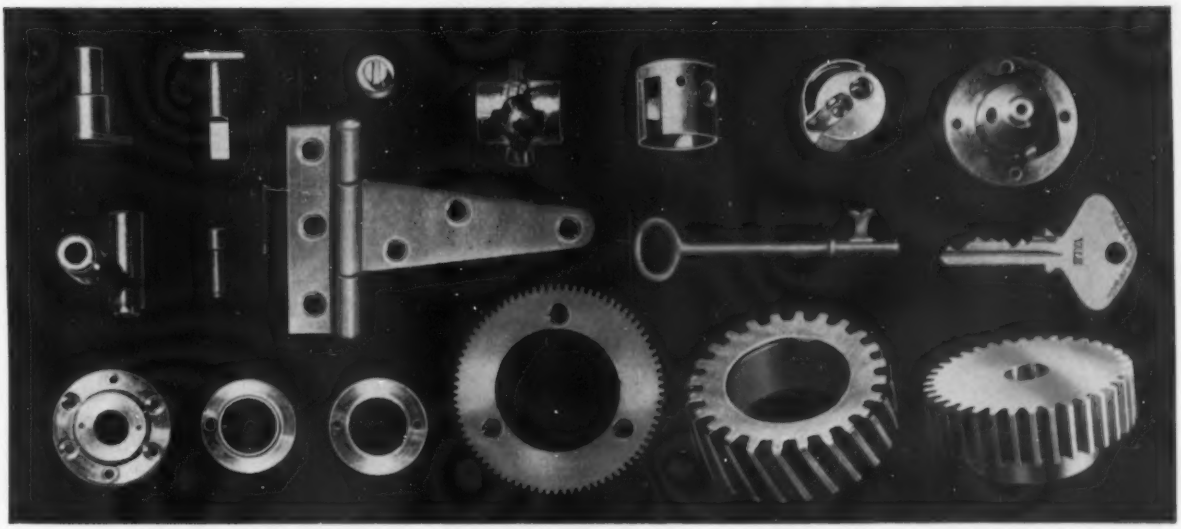
Made in U.S.A. by Minnesota Mining and Manufacturing Co., St. Paul 6, Minn.—also makers of "Scotch" Brand Pressure-Sensitive Tapes, "Scotch" Sound Recording Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing, "3M" Abrasives, "3M" Adhesives. General Export: 122 E. 42nd St., N.Y. 17, N.Y. In Can. London, Ont.



HONITE is a hard, extra-durable natural stone that resists fracturing and crumbling . . . retains its cutting edges longer than granite. Use it for close tolerance work or minimum removal of metal.

SUPER HONITE, a synthetic stone, is world's toughest abrasive chip—lasts longer than any other barrel finishing abrasive. Cutting edges never wear smooth. It's engineered for grinding and burnishing to a high lustre finish.

...There's a HONITE Chip...



...for every Barrel-Finishing Need!

Minnesota Mining and Mfg. Co.
Dept. PM-54, St. Paul 6, Minn

I'd like to get more facts about Honite Products. I'm particularly interested in ☐ Honite Compounds ☐ Honite Chips ☐ Honite Barrel Finishing Equipment.

☐ Send me free copy of booklet "Barrel Finishing Manual"
☐ I'd like to talk with a HONITE Sales Engineer

NAME.....TITLE.....

COMPANY.....

ADDRESS.....

CITY.....ZONE....STATE.....

TYPE OF PRODUCT TO BE FINISHED.....

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Felts Used in Metal Finishing -- cont.

alter the appearance or the properties of aluminum surfaces. Grinding calls for suitable abrasives such as aluminum oxide or emery. The wheel turns at a peripheral speed of approximately 6000 feet per minute. Higher wheel speeds tend to overheat the work while lower speeds may loosen the abrasive from the wheel.

Although polishing aluminum and alloys calls for the same procedure as the polishing of other metals, the actual operation is accomplished at lower wheel-to-metal pressures. Finer abrasives, with a more gentle cutting action are employed for aluminum than for steel. Roughing, an aluminum polishing operation, uses wheels faced with abrasives of 50 to 100 grit.

In aluminum finishing, greasing or oiling is a refined roughing procedure. A soft felt wheel faced with 100 to 220 grit aluminum oxide or emery, plus a lubricant (tallow or beeswax) to prevent overheating, is employed. Peripheral speeds of about 6000 feet per minute are used.

This is an important and necessary operation in finishing castings and other fabricated work which has been marred by previous operations. Sand castings are invariably given this greasing treatment after being rougher, and die castings are given it as the first polishing operation (in aluminum finishing, polishing includes roughing, greasing, buffing and coloring). The felt wheel has the advantage of uniform density and contains no sewed or cemented seams.

Finishing Copper — The mirror-like finish of copper is obtained by buffing utilizing very fine and relatively soft abrasives, such as rouge (red ferric oxide), crocus (purple ferric ovide), tripoli or lime, with a wheel of felt. The buffing compound is prepared by mixing the abrasive with stearic acid and tallow and forming it into a bar or cake which is pressed against the revolving felt wheel.

Manufacturers of Bobs and Wheels

All felt polishing wheels and bobs have one thing in common; nothing goes into them but wool and work. The manufacturing process involves hardening and extensive fulling, a mechanical process of kneading the wool fibers under controlled conditions of heat, pressure, moisture and lubrication.

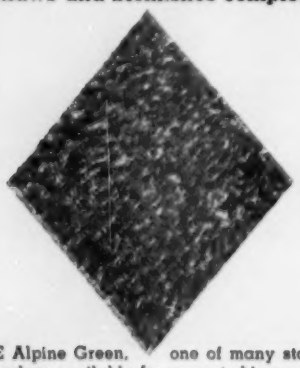
ROTATING BANDS
cont. from page 48

ting speeds, feeds, and depth of cut. A given micro inch finish was specified for the finish ma-

THE MOST AMAZING FINISH DEVELOPMENT IN 100 YEARS!

COLOR-FLECKED PLEXTONE®

Imagine—a textured and MULTI-COLORED finish — sprayed at ONE time, from ONE gun, in ONE coat that covers surface flaws and blemishes completely!



PLEXTONE Alpine Green, one of many standard pre-mixed colors available for prompt shipment. Also available in solid colors and in custom multicolors.

CAPSULE FACTS

COLOR-FLECKED PLEXTONE is a new industrial finish in which colors exist separately until sprayed, when they interlace as shown above.

CHARACTERISTICS

Lacquer base • Air dries approx. 30 minutes — dries hard 2 to 3 hours • Available in flat or semi-gloss • Good chemical resistance • Exceptional hiding power • Does not stain • Resists wear, chipping, cracking • Can be scrubbed, even scoured • Can be touched up without showing • Thicker film hides surface imperfections, covers porous materials • Available in non-toxic grades • Bonds readily to wood, wallboard, paper, cement, plaster, phenolic impregnated papier-mache forms, plastics, woven fabrics, and metals such as cast iron, steel, aluminum, brass, copper.

PLEXTONE—CUTS FINISHING COSTS UP TO 35%
Eliminates much costly pre-finishing, hides surface flaws. Usually only one prime, one PLEXTONE coat required!

PLEXTONE — UNBELIEVABLY RUGGED!
Color flecks go "thru-the-film," resist abuse, defy alcohol, grease, oil. Can be washed, scoured, without damage!

PLEXTONE — SALES APPEAL OF MULTICOLOR!
Endless new effects of 2, 3 or more colors sprayed from one gun, at one time . . . tone-on-tone, spatter-dash, etc., etc.

PROVE IT TO YOURSELF—MAIL COUPON TODAY

MAAS & WALDSTEIN CO.
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PIONEERS IN PROTECTION

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Gentlemen: Please send me FREE color chips, PLEXTONE sample, and application data.
I am particularly interested in PLEXTONE for finishing _____
Name _____ Title _____
Company _____
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chined band, and this grade of finish is now very easily surpassed in production.

Test Reports Due This Month

It is obvious that grave initial problems have been solved, and pertinent processes and operations are trouble free. This includes specifications, raw material in sufficient quantity and of proper quality, and finally the assembly and machining of the bands.

The questions now might well be asked, "What is the status of the iron powder rotating band program at the moment?" Of course, these questions may only be answered by the Office of the Chief of Ordnance. However, the AOA powder metallurgy committee has determined that the interest of the Army Ordnance Department is alive and keen. Moreover, the Chief of Ordnance directed that a Coordinating Committee on powder metallurgy be established. That committee is working successfully and making valuable contributions.

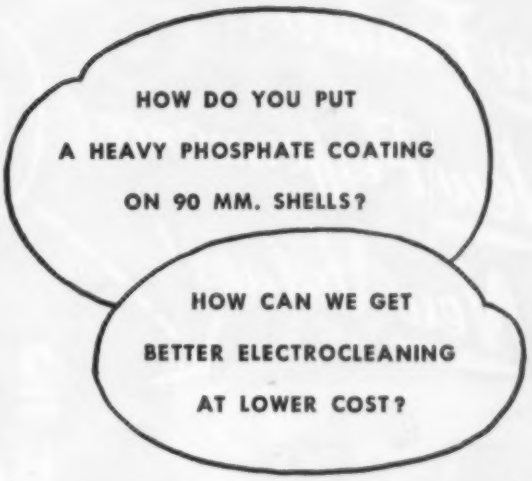
A great many tests have been and are being made on shells of various calibre. As of this time, test firing on a sufficient quantity of shells to permit broad evaluation is in the final stages of its concusion. Unofficially, it has been stated that some time in May an official report will be available giving the results obtained in test firing these 10,000 rounds of shells. An unofficial report stated that inspection of recovered fired shells showed that **the bands, without exception, remained intact and that there was no evidence of any breakout of even tiny sections in any part of the band.**

Aside from the program mentioned, there are several others in process. These are rotating bands and kindred units.

Ordnance and the iron powder producers have been praised, as has the work of the powder metallurgy committee. Actually the progress and achievements listed are due to a closely coordinated effort among the U. S. Army Ordnance, the AOA, and industry.

NEW FIELD ENGINEER

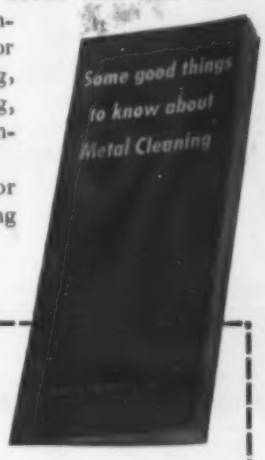
Hanson-Van Winkle-Munning Co., Matawan, N. J., manufacturers of plating and polishing equipment & supplies, announces the appointment of Eugene G. Gwyer as sales engineer for the Michigan-Ohio area, with headquarters at Detroit.



These are two of the simplest questions on metal-cleaning we answer every day. Hundreds of tougher ones are asked of the 180 Oakite Technical Service Representatives throughout the country, or come to us through the mail.

We thrive on questions about tank and machine cleaning, electrocleaning, pickling, preparation for painting, paint stripping, steam-detergent cleaning, barrel finishing, rust prevention and related subjects.

There's space below for asking your metal-cleaning question.



OAKITE PRODUCTS, INC.
340 Rector St., New York 6, N. Y.

Tell me (without obligation) about Oakite methods for removing the following soils:

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☐ ALSO send me a FREE copy of your booklet "*Some good things to know about Metal Cleaning.*"

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Company _____

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Technical Service Representatives in Principal Cities of U. S. & Canada

SPECIALIZED INDUSTRIAL CLEANING

OAKITE

MATERIALS • METHODS • SERVICE

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New Features! New Performance! New Values!

ALMCO

Supersheen

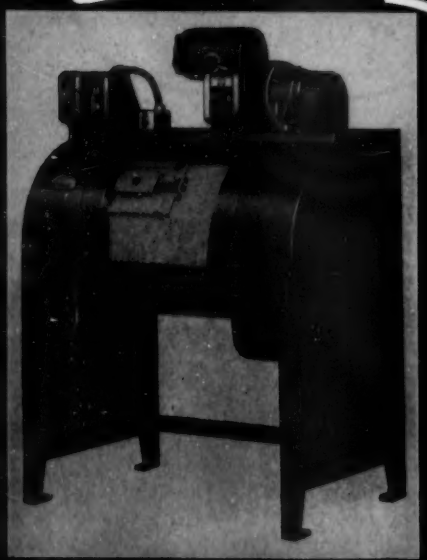
SPEED FINISHING

ALBERT LEA, MINN

2 New & Improved BARREL FINISHING MACHINES

YOU ASKED FOR THEM—

Now Here They Are!



Model DB-50. Barrel speeds 10 to 30 RPM, variable. An entirely *new* capacity for intermediate size runs. Saves capacity of larger units for full batches. Compact design. All metal construction, shipped complete, ready to connect to line voltage for operation. Single barrel, one or two compartments.

Model DBO-1A. New, compact model. Less floor space . . . simplified operation . . . fingertip control. Variable speeds 8 to 45 RPM. Features: Built-in panel mounted, all-in-one control and drive unit. Twin barrels—8" wide by 16" across flats. Self-contained screening drawer for loading, unloading, separating parts from media.

Another *Supersheen* first! The newest development in the industry—to keep pace with your expanding requirements for *Supersheen Speed Finishing.*

These two brand new Supersheen Models are vastly improved—their many advanced features make them of special interest to everyone concerned with *A Better Finish—Faster!*

With certified cost savings of up to 95% over other methods, Supersheen Speed Finishing merits your investigation. The coupon will bring factual data.

MAIL COUPON TODAY!

New 52 page catalog gives complete details of Supersheen—many actual, unretouched "before and after" pictures, complete information on Supersheen compounds and media. Case histories of actual cost savings up to 95%.

Almco Supersheen, Queen Stove Works, Inc.,
Albert Lea, Minnesota Dept. D-5

Please send Almco Supersheen Catalog and details of free sample processing and engineering service.

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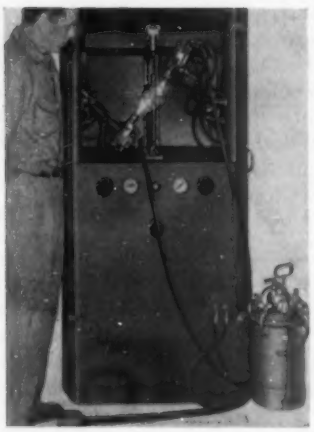
New Products ... the Reader Service Cards will bring full details



SEMI-AUTOMATIC SPRAY PAINTING

. . . 1200 pieces per hour

A new semi-automatic spray painting machine that is reported to achieve drastic cost reductions in spray painting has been announced.

Savings in painting costs have been made on a wide variety of parts, from a die cast housing 6″ x 6″ x 3″ to small dials and knobs 1½″ diameter, which have been painted as fast as 1200 pieces per hour

To assure reaching the hard places on parts with angles, corners and bridges, an oscillating gun is provided which makes the set-up easier and quicker. Stationary gun positions are also provided.

For easy feeding of parts, the mask opening always comes to the same position when the spindle stops rotating. Speed of rotation, timing of paint guns, gun oscillation and air pressure are easily set by control knobs.

Finish Engineering Co., Inc.

For more information circle No. 196 on the Reader Service Card

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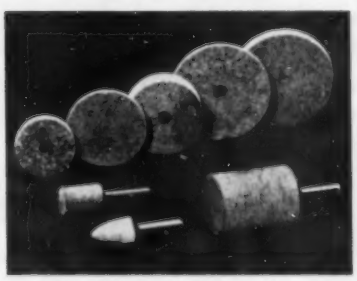

FLEXIBLE ABRASIVE WHEELS

. . . rough & finish in one operation

This new line of abrasive wheels is classed as all-purpose by the manufacturer. By a blend of abrasive grains, synthetic fibres and a specially developed binding agent, both roughing and finishing can be done in one operation on practically any material.

The new line of wheels consists of mounted points, straight wheels, depressed center discs, and cutoff wheels.

The wheels are resilient and flexible, they absorb shock, reduce chatter, and resist loading. Highly efficient cutting and polishing in one operation is made possible because of the extreme strength and the cushioning action which eliminates grinding marks.

Metal Removal Co.

For more information circle No. 201 on the Reader Service Card

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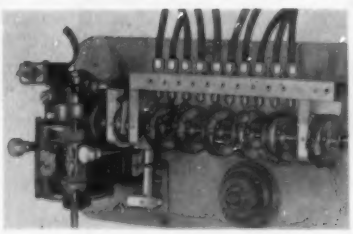


ELECTRO PNEUMATIC TIMER

. . . for sequence control of air cylinders

This new timer controls the action of air cylinders in an almost infinite variety of sequences. The unit illustrated operates 12 single-acting or 6 double-acting cylinders, but by increasing the number of rotors and cams a larger number of cylinders could be handled.

The machine consists merely of a small special electric motor which is geared to a revolving shaft. Mounted on the shaft are a series of rotors, each provided with four adjustable cams. As the cams revolve with the shaft, they trip miniature poppet valves, which convey a compressed air impulse to the operating valve.

continued next page

In addition to the variations in cycle obtained by moving cams, the duration of the cycle can be regulated by changing the motor gears. A set of 10 quick-change gears permit cycle variations from 3 seconds to 33 seconds. A lock-out lever permits instant change from continuous operation to a "one shot" push button type of cycle.

Mead Specialties Co.
For more information circle No. 198 on the Reader Service Card

REDUCED OXIDE IRON POWDER . . . for high strength compacts

A new iron powder has just been announced that is said to produce compacts of higher than average density and strength when pressed and sintered under the same conditions. The powder has an apparent density of 2.5 g/cc and a flow rate of 28.5 sec./50g.

When pressed at 30 tsi and sintered at 2050F for 30 min. in dry hydrogen the iron powder alone gives a compact with the following properties.

Density	6.42 g/cc
Axial growth	—1.80%
Radial growth	—1.05%
Transverse str.	86,750 psi
Tensile strength	31,440 psi
Elongation in 2 in.	2.7%
Hardness	Rockwell E 70

Addition of copper up to 5% increases strength and hardness and decreases elongation.

Increasing the sintering temperature and time increase the physicals with corresponding increase in shrinkage and some danger of distortion.

Plastic Metals Div.
For more information circle No. 199 on the Reader Service Card

LEAD SCREW TAPPING HEAD . . . for any drill press

A new, complete lead screw tapping head that enables unskilled help to produce precision threads on any drill press has been put on the market.

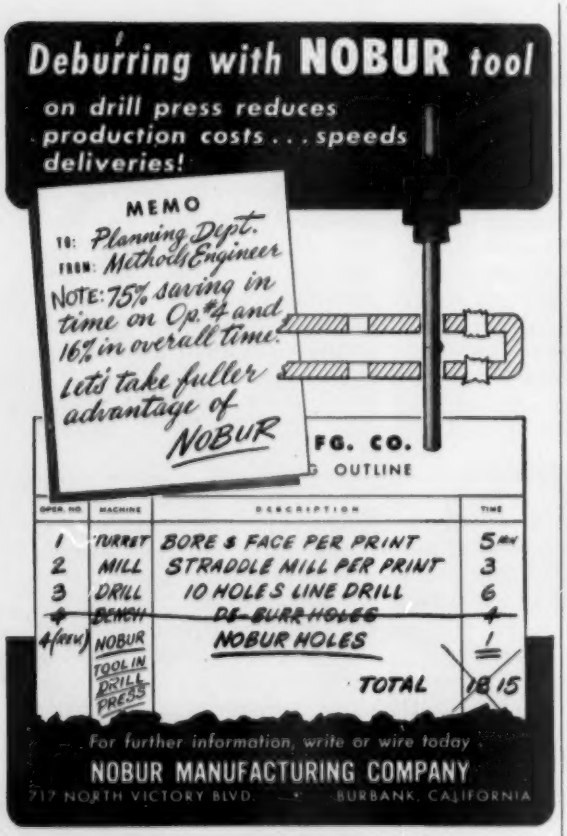
The tap head features a rapidly interchangeable lead screw, a new type cone clutch reversing mechanism, and positive depth control to assure perfect threads even in blind or recessed holes.

Higher production is made possible by the new tapping head, because the tap withdraws faster, the floating work piece is positioned rapidly, and operator fatigue is reduced. Tap breakage and work spoilage are reduced since the mechanism is actuated before the tap engages the work and the lead screw guides the tap in and out of the work.

Automatic Methods, Inc.
For more information circle No. 197 on the Reader Service Card

MOLD RELEASE AGENTS . . . especially for shell molds

Two new silicone release agents have been developed for shell molders who wish to


Deburring with NOBUR tool
on drill press reduces production costs . . . speeds deliveries!
MEMO
TO: Planning Dept.
FROM: Methods Engineer
NOTE: 75% saving in time on Op. #4 and 16% in overall time. Let's take fuller advantage of NOBUR
FG. CO.
OUTLINE
OPER. NO. | MACHINE | DESCRIPTION | TIME
1 | TURRET | BORE & FACE PER PRINT | 5 MIN
2 | MILL | STRADDLE MILL PER PRINT | 3
3 | DRILL | 10 HOLES LINE DRILL | 6
4 | BENCH | DE-BURR HOLES | 4
4(NEW) | NOBUR TOOL IN DRILL PRESS | NOBUR HOLES | 1
TOTAL 18 15
For further information, write or wire today
NOBUR MANUFACTURING COMPANY
717 NORTH VICTORY BLVD. — BURBANK, CALIFORNIA

Circle No. 80 on the Reader Service Card

Maintain steady production
"reduce down time"
No Trick to it!
With Procunier Tapping Heads
Whether it's light, medium, or heavy tapping, for short or long periods Procunier Tappers are performing with a new found ease, a more dependable and consistent accuracy and providing many extra hours of tapping efficiency. They maintain quality and reduce spoilage and breakage to a minimum.
Here are just a few "reasons why": New, sensitive double-cone friction clutch automatically regulates driving pressure with a soft "cushioned" action; simple, one shot lubrication; ballbearing equipped; heat treated gears with a special gear reversing mechanism; unique double supported tap holding spindle; lightweight housing; exclusive Tru-Grip Tap holder; plus other important features.
NEW TRU-GRIP tap holder
Write for free circular
Giving full details and specifications on the remarkable line of Procunier Tapping Heads.
Procunier
Safety Chuck Company
14 - 16 S. Clinton St. Dept. 5 Chicago 6, Ill.

Circle No. 84 on the Reader Service Card

use solvent type agents rather than water emulsions. Identified as F-496 and F-452, they contain 5 and 50 percent solids, respectively, of high viscosity silicone fluids in mineral spirits.

Designed especially for use on deep draw, narrow draft patterns, these new silicone parting agents leave minimum build-up, ease pattern cleaning, and provide multiple releases. A single application of F-496 will release up to 15 shells.

One of the agents is ready for immediate use while the other is recommended for those who may wish to make up concentrations to meet their own specific operating requirements.

Dow Corning Corp.
For more information circle No. 202 on the Reader Service Card

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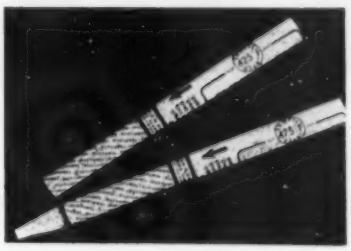
TEMPERATURE MEASURING PENCILS

. . . in two new temperature ratings



Temperature measurement, close enough for many operations, can now be measured over wider range with the introduction of several new ratings.

In the range of 113 to 400F, the markers are rated in 12½ degree intervals; from 400 to 600F in 25 degree steps; and from 600 to 2000F in 50 degree steps.

The two latest additions to this line are rated at 425 and 475 F.

Tempil Corp.
For more information circle No. 205 on the Reader Service Card

ROTO FINISH
Trademark Reg. U. S. Pat. Office

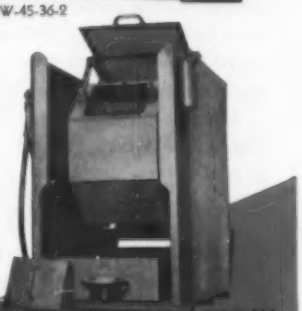
now!

put your precision finishing on a mass production basis

SAVE MANHOURS AND MONEY . . . the original Roto-Finish processes completely eliminate hand finishing in most instances. GET ABSOLUTE UNIFORMITY . . . in any quantity. MAINTAIN exact tolerance on precision parts. CUT FINISHING costs as much as 80% . . . this fact has been proved many times in actual installations. LOWER INITIAL AND MAINTENANCE costs . . . you need only one Roto-Finish machine to replace several manual grinding or polishing machines. No exhaust system is ever required.

DW-60-36-2

DW-45-36-2



ROTO-FINISH COST-FREE ENGINEERING SERVICE GUARANTEES RESULTS!

Send a few unfinished parts to us . . . plus a finished part for a guide, (or we'll be glad to pick them up from your plant) for a "no charge" demonstration. Then sit back and let us *prove* that Roto-Finish will finish your parts . . . to your specifications . . . and save you time and money. We *guarantee* that you can get the same results in your plant that we produce in our laboratory. *There is no obligation for this service.*

Write for fact-packed Roto-Finish Catalog for complete information.

Roto-Finish COMPANY

P.O. Box 988 —

FOREIGN REPRESENTATIVES: CANADA — Windsor — Roto-Finish Canada Limited • ENGLAND — London — Roto-Finish Limited — 39 Park Street — Mayfair • AUSTRALIA — Melbourne — A. Flavell Pty. Ltd. • HOLLAND — Delft — N. V. Roto-Finish Maatschappij — Rotterdamse — WEG 370A • AUSTRIA, GERMANY, SWITZERLAND — Frankfurt a.M. — Metallgesellschaft A.G., Germany • ITALY — Milan — Societa Roto-Finish a R.L. — Sesto S. Giovanni — Viale E. Marelli 31 • FRANCE — Paris — Societe Roto-Finish, 70 rue de la Republique-Puteaux (Seine) • BRAZIL — Rio de Janeiro — Commercial E. Industrial de Formos Werco, Ltds.

For additional information Circle No. 85 on the Reader Service Card

NEW PROTECTIVE COATING CHEMICAL FOR ALUMINUM

ALODIZING

Alodizing with "Alodine,"* a new technique in the protective coating of aluminum, was made available for production-scale use in 1946. Since that time Alodizing has largely supplanted the more elaborate, costly and time-consuming anodic treatments in the aircraft and other industries.

Continuous and successful industrial use has clearly demonstrated the simplicity and economy of the Alodizing process as well as the effectiveness of the "Alodine" amorphous coatings, particularly as a base for paint. In fact, the paint-bond that Alodized aluminum provides has been found to be superior to that possible with chromic acid anodizing.

The corrosion-resistance of unpainted aluminum Alodized with "Alodine" Nos. 100 or 300 is excellent, easily meeting the requirements of Specification MIL-C-5541. However, a need for protection of unpainted aluminum, even better than that obtained with chromic acid anodizing, has long been recognized.

NEW IMPROVED "ALODINE" DEVELOPED By ACP RESEARCH CHEMISTS

Several years of intensive research have now led to a new type of "Alodine," designated as "Alodine" No. 1200. This new protective coating chemical forms an amorphous mixed metallic oxide coating of low dielectric resistance that provides unusually high corrosion-resistance for unpainted aluminum. In addition, it forms an excellent paint bond that approaches closely the high quality obtained with the earlier types of "Alodine."

After having been tested for conformance with Specification MIL-C-5541, "Alodine" No. 1200 is now about to go into production.

PROCESS DETAILS

"Alodine" No. 1200 is the only essential chemical needed to prepare the coating bath and the final rinse bath. One of its unique features is that it can be used in tanks in an immersion process, or, in a multi-stage power washer in a spray process, or, with a slight adjustment of pH, with brush or portable spray equipment in a manual process. This means that even where the simple production equipment is not available, or where touching up of damaged coatings previously Alodized or anodized is required, excellent protection and paint bonding can still be obtained with practically no equipment.

All three methods of application easily meet the requirements of Specification MIL-C-5541.

Process sequence for all three methods of application is the same as for other standard grades of "Alodine" such as Nos. 100, 300, and 600, viz.: 1. Pre-cleaning. 2. Rinsing. 3. Alodizing. 4. Rinsing. 5. Acidulated rinsing. 6. Drying.

Coating time in an immersion process ranges from 2 to 8 minutes and in a mechanized spray process is about 30 seconds. "Alodine" No. 1200 baths are operated at room temperatures (70° to 100°F.) and heating is required only if the bath has gotten cold after a "down" period.

RECOMMENDED USES FOR "ALODINE" No. 1200

"Alodine" No. 1200 is specifically recommended for coating wrought products that are not to be painted or are to be only partially painted; and for coating casting and forging alloys whether or not these are to be painted. "Alodine" Nos. 100 and 300 are still recommended for coating wrought products such as venetian blind slats, awnings, etc., that are invariably painted.

RESULTS OF TENSILE TESTS

This new "Alodine" not only retards visible corrosion and pitting, but as shown in the table below, the loss of ductility with "Alodine" No. 1200, both brush and dip, after 1000 hours salt spray was less than for chromic acid anodizing after 250 hours, and for "Alodine" No. 100 and a conventional chromate treatment after 168 hours exposure.

PROCESS	SALT SPRAY EXPOSURE	COMPLIANCE WITH TENSILE REQUIREMENTS OF MIL-C-5541
CHROMIC ACID ANODIZING	168 hrs.	passes
	250 hrs.	passes
	500 hrs.	fails
	1000 hrs.	fails
BRUSH "ALODINE" No. 1200	168 hrs.	passes
	250 hrs.	passes
	500 hrs.	passes
	1000 hrs.	passes
DIP "ALODINE" No. 1200	168 hrs.	passes
	250 hrs.	passes
	500 hrs.	passes
	1000 hrs.	passes
DIP "ALODINE" No. 100	168 hrs.	passes
	250 hrs.	fails
	500 hrs.	fails
	1000 hrs.	fails
CONVENTIONAL CHROMATE TREATMENT	168 hrs.	passes
	250 hrs.	fails
	500 hrs.	fails
	1000 hrs.	fails

*"Alodine" Trade Mark Reg. U. S. Pat. Off.

CHEMICALS ACP PROCESSES

AMERICAN CHEMICAL PAINT COMPANY

General Offices: Ambler, Penna.

Detroit, Michigan **Niles, California** **Windsor, Ontario**

For additional information Circle No. 71 on the Reader Service Card

IMPROVED BACKSTAND IDLER
. . . has tension & tracking adjustment

Faster abrasive belt finishing with less down time is reported in an improved back stand idler.

The improved idler provides belt tension and tracking adjustment from the operator's position. The tracking adjustment moves the idler pulley from side to side instead of turning the face, thereby avoiding destruction of bond. The idler tracks belts from ¼" to 6" wide.

One motion tension release permits belt change in a few seconds. The idler pulley is balanced, has a 5" face and is 10" in diameter with closed ends. The entire unit is grease sealed and runs on ball bearings.

Matheu Tool Works
For more information circle No. 202 on the Reader Service Card

JET BLAST CLEANER
. . . for branch operation

A bench model jet blast cleaning unit for the large and small metal working shops is now available.

According to the manufacturer this unit will show savings up to 60 percent in labor costs in cleaning, burring and etching metals.

The jet blast method of cleaning employs a fine abrasive particle suspended in a particle suspended in a liquid. The slurry is picked up by an injector and propelled by a high velocity air stream. No pumps, gears or other moving parts are in contact with the abarsive so that wear and maintenance are minimized.

The clean matte surface produced by this equipment increases the adherence and bonding of paint, porcelain, rubber, electroplated metals, etc. It is also effective in cleaning of finishing threads for a close fit.

R. W. Renton and Co.
For more information circle No. 203 on the Reader Service Card

ELECTROPLATING RECTIFIERS
. . . 5 to 50,000 amp. capacity

A new line of electroplating rectifiers has recently been developed to accommodate any application requiring a positive source of continuously smooth d. c. current at capacities from 5 to 50,000 amp.

Five basic models are available ranging from the smallest bench type with a capacity of from 5 to 200 amperes, up to the largest package unit with a capacity of from 2,000 to 50,000 amperes.

Wagner Brothers, Inc.
For more information circle No. 205 on the Reader Service Card

DRILLING & TAPPING MACHINE
. . . has variable speed

The latest development in variable speed drilling and tapping have been announced.

The new machine features infinitely variable speed selection to meet the important needs of the industry. The machine, a four spindle one, has power feed on the first two spindles, hand feed on the third spindle and a reversing motor tapper on the fourth spindle. Other arrangements are possible depending upon the work to be done.

Edlund Machinery Co.
For more information circle No. 206 on the Reader Service Card

DRIES SMALL PARTS Faster–Better..

DOES IT FOR LESS!

Kreider Dryer with auxiliary gas heating unit (illustrated). Auxiliary steam heating unit available; also standard model without auxiliary heating.

Basket (shown below). Heavy gauge steel woven mesh over steel frame. Capacity, 1140 cu. ins.

Spin-Dries* up to 50 pounds in less than 2 minutes

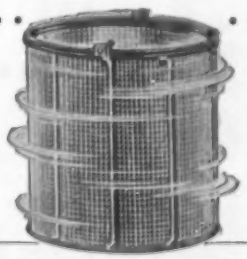
Simple design . . . careful engineering, sturdy construction assure trouble-free, low-cost maintenance operation. Operates at 625 r.p.m. on less than 1 h.p.

No scarring or marring . . . with Kreider Dryer. Centrifugal force holds parts immovable in basket . . . assures smooth, evenly dried surfaces, long-lasting luster, minimum "rejects".

One man runs it! Standard model Kreider Dryer occupies less than 6 sq. ft. floor space. One man tends—loads, unloads—keeps production moving, prevents expensive, time-wasting tie-ups.

See for yourself! Write Department PR 554 for illustrated 4-page folder . . . also addresses of installations near you.

New Holland Machine Co., New Holland, Pa.



***Only 2 simple steps required . . .**

(1) Operator places wire mesh basketful of small parts in Dryer . . . turns motor "ON."

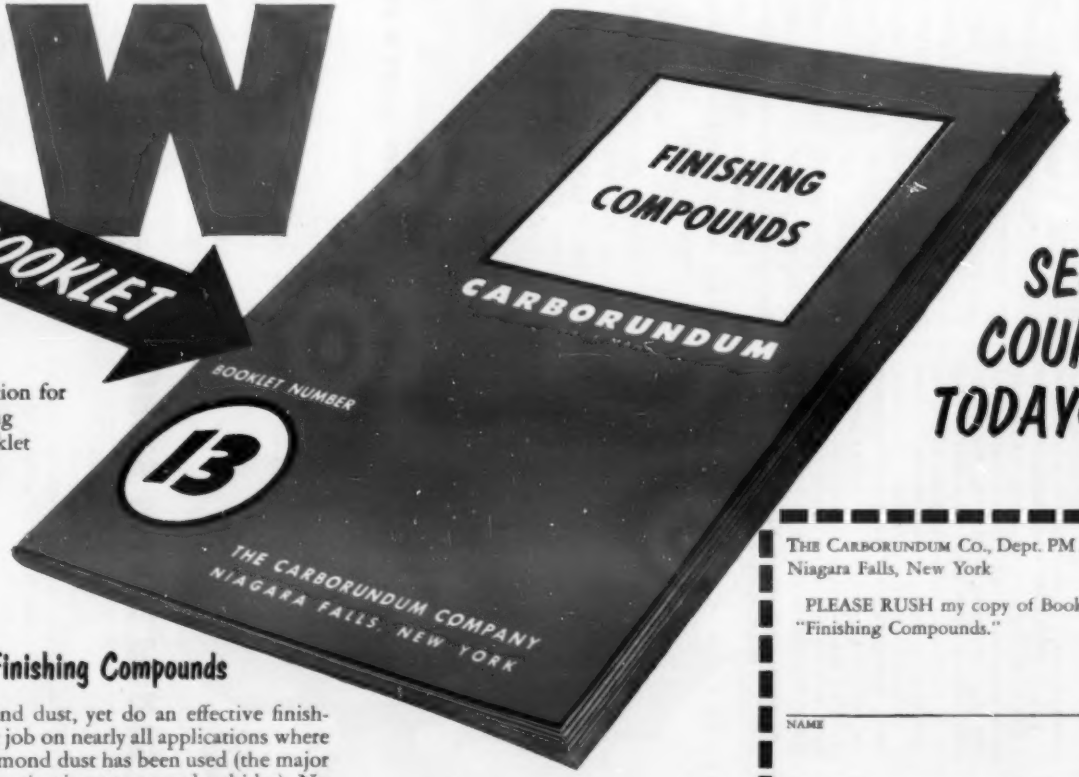
(2) Operator turns motor "OFF" . . . presses foot brake . . . removes basket.

NEW HOLLAND KREIDER DRYER

For additional information Circle No. 78 on the Reader Service Card

NEW

FREE BOOKLET



● **36 pages of expert counsel on lapping and finishing** Here's up-to-date information for you on all kinds of lapping and finishing problems...in a complete, concise new booklet by CARBORUNDUM. Covers all types of operations and describes the Abrasive Compound by CARBORUNDUM that does each job best.

Why it pays to come to CARBORUNDUM for Finishing Compounds

CARBORUNDUM is the largest producer of crude and manufactured abrasive grains in the world...the *only* abrasives manufacturer offering a complete line of lapping and finishing compounds.

Both silicon carbide and aluminum oxide grain, combined with the proper carrier, are used in CARBORUNDUM's Finishing Compounds. Each has its place: silicon carbide for finishing hardened metals, aluminum oxide for the softer metals. They cost much less than diamond dust, yet do an effective finishing job on nearly all applications where diamond dust has been used (the major exception is on cemented carbides). No special grades of cast iron are necessary for the lapping disc—another saving. The booklet "Finishing Compounds," tells the full story...gives specifications for all the common applications. If you have a special problem, CARBORUNDUM's engineering service will assist you without obligation.

...continually putting more sense in your abrasive dollar

CALL YOUR CARBORUNDUM DISTRIBUTOR or Salesman, listed in the yellow pages under "Abrasives" or "Grinding Wheels." Or send the coupon today for your free copy of this helpful booklet.

SEND COUPON TODAY

THE CARBORUNDUM CO., Dept. PM 83-42
Niagara Falls, New York

PLEASE RUSH my copy of Booklet 13, "Finishing Compounds."

NAME

COMPANY

STREET AND NUMBER

CITY ZONE STATE

CARBORUNDUM
REGISTERED TRADE MARK

83-42

For additional information Circle No. 73 on the Reader Service Card

PRECISION METAL MOLDING

Product Facts

Catalogs · Manuals · Brochures

MATERIALS & EQUIPMENT

Salt Bath Heat Treating: 144
A new four-page brochure describing the pressed steel pots made by Eclipse Fuel Engineering Co. is ready for distribution. The brochure shows how heat treating costs can be cut through the use of these long lasting pots.

Industrial Application of X-Rays: 145
A new house organ has just made its initial appearance. Known as Radiation Digest and published by the X-Ray Dept. of the General Electric Co., the bulletin will espouse the cause of industrial x-ray application.

Die Casting Machines & Controls: 146
Loose leaf sheets describing the die casting machines and the operating consoles made by Projectile & Engineering Ltd. of London are now available. The operating consoles are so arranged that maximum flexibility of sequenced operations is possible.

Zinc Die Castings, Properties & Applications: 147
Published monthly as a house organ and distributed to all interested parties, the Alloy Pot of New Jersey Zinc Co. shows applications of die castings, suggests new ones, and generally keeps abreast of the zinc situation.

Corrosion Resistant Alloys: 148
The Resistance of Cast Fe-Cr-Ni Alloys to Corrosion in Oxidizing and Reducing Flue-Gas Atmospheres is the title of a paper available from the Alloy Casting Institute.

Machinability Report: 149
A new 48-page report on the machining characteristics of leaded steel and free-cutting brass has been issued by the Titan Metal Mfg. Co.

Vertical Milling Machine: 150
A new vertical milling machine with a self contained universal head has been announced by Duff Machine Co. A brochure describing the new machine is available.

Air Chucks and Air Cylinders: 151
In an eight page brochure dealing with air chucks and air cylinders two new types of chucks and an improved air cylinder are described. The brochure is available from the Whiton Machine Co.

Pressure Processing Equipment: 152
A new bulletin has been issued by Hydraulic Press Mfg. Co. which describes the line of hydraulic presses and pressure processing equipment made by that company. The bulletin also describes the complete line of hydraulic components available from H-P-M.

Pressed Metal Parts: 153
A four page brochure describing, briefly, the powder metallurgy process and the facilities of the company can be secured from Brockway Pressed Metals, Inc.

Dry Film Lubrication: 154
For lubrication jobs involving high temperatures, excessive cold, inaccessibility, high speeds, high loads, and other extreme conditions, a dry film lubricant may be the answer. A file folder on the subject has been prepared by Electrofilm, Inc.

Metal Powder Press: 155
Designed specifically for the powder metallurgical process, a new 50-ton metal powder compacting press by Baldwin-Lima-Hamilton is fully described in a four-page brochure.

Liquid Mold Release: 156
Originally designed as a release agent for injection molding of polystyrene plastics, a new mold release agent is finding wide application as a general release agent for all plastics and die cast metals. Vin-Rock, Inc., the manufacturer, has technical information available.

Ladles & Crucible Tongs: 157
For handling molten metal either in trolley ladles or in crucibles, the equipment manufactured by the Industrial Equipment Co. may be the answer. Literature is available from the company.

Surface and Immersion Pyrometers: 158
The Pyrometer Service Co., Inc. has brochures describing a new line of surface and immersion pyrometers. The line consists of three surface and one immersion pyrometers.

Unalloyed Titanium: 159
A four page booklet by Mallory-Sharon Titanium Corp. gives the properties of this material made by the double melting process. The booklet also contains tips on fabricating and forming titanium sheet. The sheet titanium produced has uniform characteristics throughout and the carbon content can be controlled.

Dynamometers: 160
Bulletin no. DB-1 from the Eaton Mfg. Co. in 16 pages describes in detail a complete line of cooled, absorption, motoring, universal and special purpose dynamometers. Data pertains to construction of equipment, accessories and controls. The report contains numerous drawings, graphs, and data charts.

continued next page

a good pattern
for you to follow

for dependable, trouble-free D.C. conversion . . . choose

Sel-Rex

SELENIUM RECTIFIERS

A recent survey of plants throughout the nation using rectifiers for DC conversion revealed that SEL-REX units were building up the greatest records in efficiency and dependability.

SEL-REX places no limitation on engineering to achieve the finest DC power plant . . . nor compromise in the choice of components to "bring the cost down". True, such a policy may reflect a slightly higher initial cost . . . but in the long run, a SEL-REX is the most economical. There are no moving parts to wear out, no maintenance expense, no loss of production.

SEL-REX RECTIFIERS are available for every requirement from 25 to 50,000 amperes in completely sealed water cooled or air cooled models.

Write Dept. PM-5 for complete details.

NEMA

BART-MESSING CORPORATION

229 Main Street · Belleville 9, N. J.

For additional information Circle No. 72 on the Reader Service Card

PRODUCT FACTS — cont.

FINISHING

Backstand Idler: 165
In a four page bulletin, the Carborundum Co. describes a new backstand idler recently developed. The idler can be attached to almost any type of wall, bench or floor unit for coated abrasive grinding and polishing operations.

Modern Metal Finishing: 166
The E. I. du Pont de Nemours & Co. publication, Modern Metal Finishing, can be secured by anyone interested in the subject of metal finishing. Also available are separate booklets on the degreasing of metals with Triclene D.

Deburring Holes: 167
A new brochure by Nobur Mfg. Co. describes some of the applications of their rotary hole deburring equipment on both machine parts and sheet metal.

Drilling & Tapping Machines: 168
Standard drilling and tapping units that can be used as is or built up into special purpose units are described and illustrated in Bulletin No. 150 issued by Edlund Machinery Co.

Chromate Reducer: 169
A new product for destruction of hexavalent chromium in alkaline cleaning and plating solutions has been announced and literature on it is available from Enthone, Inc.

Enamel Stripper: 170
Enthone, Inc. has just issued information on a new stripper specifically designed for use on Epoxy Enamels and most other enamels.

One Inch Abrasive Belt Machine: 171
Hammond Machinery Builders has recently developed a new abrasive belt machine to use one-inch width belts. With the new machine, hitherto hard-to-finish places can be quickly and easily sanded. Literature on the machine is available.

Pickling Fume Inhibitor: 172
A new product designed to reduce the fumes from pickling operations has been added to the line of the Cowles Chemical Co. Literature on the new compound gives all of the properties and specific information on uses.

STAINLESS STEEL POWDER
continued from page 56

industrial meters, that measure highly corrosive liquids, are also being replaced by stainless powder parts. It has been suggested that the lower density and unique structure of the powdered compact in the bushing and gear applications resist seizure and have better wear qualities, than those made from wrought or cast materials.

Other applications are in the fabrication

of cigarette lighter cams, guides for fishing rods, small gears, levers and bushings.

Industrial-type porous metal filters have also taken on the "Powdered Stainless Look". As in the straight sintered compact applications, corrosion resistance, wear and strength properties have proved of great importance in filters. The unique types in this field are in biological, gas and liquid filters. One example of this is the manufacture of gasoline line filters for the aircraft industry. De-icer sections on the leading edges of aircraft are also being made in porous stainless steel sheets.

Recent developments in the manufacture of magnetic clutches where iron powders are used, have indicated that ferritic chromium (magnetic) stainless type powders far surpass iron in wear, strength and corrosion properties.

A specialized powder, such as stainless steel, with its unique corrosion resistivity, heat resistance, high strength, toughness, magnetic or non-magnetic properties broadens the scope of powder metallurgy and it applications. At the moment the largest potential field for stainless steel powder is in the automotive industry. We do not venture a guess as to where that potential may lie next year.

[1]Produced by Capital City Products Company, Columbus, Ohio.

Stainless Steel?...Yes
How?
Investment Cast by JELRUS
Send us your prints or parts for quotation.
You might have similar intricate parts which are a problem to machine and tool up. Try us. All metals —aluminum, bronze, stellite and a wide variety of steel alloys.
JELRUS
Write for FREE Manual TODAY
JELRUS
PRECISION CASTING CORP.
136 WEST 52nd STREET
NEW YORK 19, NEW YORK

For additional information Circle No. 35 on the Reader Service Card

ENORMOUS SAVINGS IN COLOR DECORATION OF 3-DIMENSIONAL PARTS

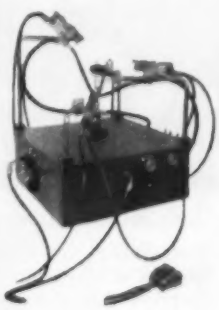
ELECTRO-FORMED METAL SPRAY PAINTING MASKS

(Made by Patented Process)

Permit rapid wet painting, one color after another. Clean, sharply defined letters and decorative effects obtained on intricate die castings, stampings and plastic forms by accurate control of painted areas. No fogged edges. After-wiping or buffing-off of overspray unnecessary. The "loose" inside of letters and numerals, such as "O" and "6", is held in position by arched bridging to eliminate objectionable "ties". Plug-type masks [keep depressed areas clear, while spraying background]; lip-type masks [protect background while painting depressed areas]; and block-cutout, plane-surface type masks.

Foot treadle air-operated clamps, fixtures and tools which position and hold the piece snugly in the mask; and permit the operator to use both hands.

We design, engineer and build automatic, entirely air-operated machines for spray decorating a variety of small parts at speeds of up to 3600 per hour. Masks inserted flush with top of work table. Spraying is from below. Dials regulate cycling speed and amount of paint sprayed. The same amount of paint is sprayed on every part, regardless of speed of loading cycle. Effect paint savings up to 50% over hand spraying. Employ automatic guns and air-agitated paint pressure tanks with insert containers.



AUTOMATIC, SINGLE-SPINDLE PAINTING MACHINE

Eliminates need of costly conveyorized systems on shorter runs. Can be used in most standard spray exhaust booths. One dial regulates spindle speed from 100 to 400 rpm., another the length of time the spray guns operate. Spindle and guns, actuated by foot pedal, stop automatically as predetermined by dial setting. Speed of operation is dependent upon the required loading time which in turn is controlled by the nature of the piece being sprayed and whether masks are employed.

Provision is made for mounting up to four guns, one in each corner as required to cover the work. Even deposition of paint assured. Work-holder also serves as masking device if desired.

We also manufacture mask washing equipment.

CONFORMING MATRIX CORPORATION
346 Toledo Factories Bldg., Toledo 2, Ohio

Please send without obligation, details on [ ] Automatic Rotary Indexing Painting Machines; [ ] Automatic Single-Spindle Painting Machines; [ ] Hand Masks; [ ] Mechanical Masking Fixtures; [ ] Air-Operated Masking Fixtures; [ ] Stationary, Automatic Spray-Painting Masking Machines; [ ] Rotary Table, Automatic, Spray-Painting Masking Machines; [ ] Mask-Washing Equipment; [ ] Quotations on masks for parts [or prints] which I am forwarding.

NAME.....

FIRM.....

STREET.....

CITY & STATE.....

On West Coast: 36 LaPorte St., Arcadia, Calif.

For additional information Circle No. 74 on Reader Service Card

Precision Castings Holds Sales Meeting

Biggest year in the company's history was reported at a sales meeting for Precision Castings Company personnel, held recently at the firm's home office in Fayetteville, N. Y. William J. During, president of Precision, told the group that the firm's consumption of aluminum and zinc during 1953 was at the rate of 40,000,000 pounds per year. Mr. During also saw the possibility of an even greater year in 1954 if the industry trend toward increased use of die castings continues.

Attending the meeting were — Seated (l to r): Albert G. Lintel, vice president in charge of production; J. J. Punke, vice president, engineering & manufacturing; A. G. Witt, sales engineer; A. G. Chase, chairman of the board; T. H. Pickering, Chicago plant manager; W. C. Berry, Michigan sales manager; S. C. Frost, president of Precision Castings Co. of Kalamazoo, Mich.; Clarence Fuehrer, sales engineer; Walter Parcell, chief industrial engineer.

Standing (l to r): E. R. Mason, sales engineer; H. L. Weilbye, Jr., sales engineer; R. P. McClure, secretary; Philip Surdyke, sales engineer; H. F. Kline, Kalamazoo quality control and sales; Robert Osborne, assistant sales manager; Mr. During; H. C. Jagade, sales engineer; A. D. Weigolt, Cleveland plant manager; G. C. Curry, Eastern sales manager; Harry Spaet, sales engineer; V. B. Ressler, sales engineer; Donald Cathers, customer relations engineer; Jack Lawson, sales engineer; J. R. Traver, sales engineer; R. L. Myers, chief of time study.

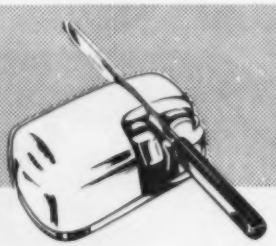
Absent from the picture: R. W. Castle, vice president in charge of sales; J. F. Ackroyd, sales engineer; W. J. During, Jr., end product sales engineer.

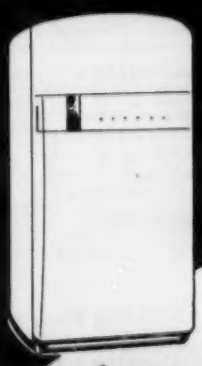
KITCHEN APPLIANCES

demand

ZINC DIE CASTING ALLOYS

for . . . TIME-TESTED *Durability*





HOUSEHOLD APPLIANCES MUST BE GRACEFUL, YET WEAR *RESISTANT*

The simple, yet graceful lines of refrigerators, knife sharpeners, kitchen utensils and hardware make themselves amenable to die castings. Zinc die cast decorative fittings, parts of food mixers and fruit juicers and medallions (most are chrome plated), possess the required strength and dimensional accuracy for trouble-free assembly and service. These die castings, therefore, cut machining cost to a minimum.

Our full staff of metallurgical and foundry engineers is available for consultation to help solve any problems you may encounter in the die casting of zinc, aluminum and brass. This service is offered without cost or obligation.

R. LAVIN & SONS, INC.

• *Producers of Zinc Base Die Casting Alloys*
• *Refiners of Brass, Bronze and Aluminum*

3426 S. KEDZIE AVENUE • CHICAGO 23, ILLINOIS

REPRESENTATIVES IN PRINCIPAL CITIES

R. LAVIN & SONS INC. 1900 54 Years 1954 SERVING THE FOUNDRY INDUSTRY

For additional information Circle No. 37 on the Reader Service Card

OPPORTUNITIES

DIE CASTING OPPORTUNITY:—Long established Die Casting Plant on Pacific Coast has opening for a man that knows his business as foreman of Die Casting Department. State background, experience, and salary now earning. Confidential. Box No. 5154, PRECISION METAL MOLDING magazine.

MANUFACTURERS' REPRESENTATIVES wish to sell zinc and aluminum die castings in State of Indiana. Must have plating facilities. We cover entire State and offer real results to right concern. Write Box No. 5254, PRECISION METAL MOLDING magazine.

MANUFACTURERS REPRESENTATIVE WANTED:—various territories, to handle Precision Die-Casting Machines with locking pressures up to 650 tons, for established manufacturer of heavy industrial equipment. Write Box 5354, PRECISION METAL MOLDING magazine.

DIE CASTING ACCOUNT WANTED:—Established New York—New Jersey manufacturer's representatives, expanding operation, have finest contacts, need A-1 die casting account. Write Box No. 5454, PRECISION METAL MOLDING magazine.

HOWARD FOUNDRY OPENS WESTERN INVESTMENT CASTING OPERATION

Howard Foundry Company of Chicago has announced the opening of a new investment casting division located in Los Angeles. The new division will be staffed by personnel from the company's new Milwaukee plant, now in full production.

West Coast facilities will be adjacent to the company's Electric Alloy Steel and Casting Division, until now the only Howard plant sand casting stainless steel. Recently, the company installed new induction furnaces in its newly named Alloy Steel and Iron Casting Division in Chicago, previously known as the Semi-Steel Division. At this plant, the company is sand casting stainless, nickel-iron alloys and ductile iron.

For additional information Circle No. 52 on the Reader Service Card

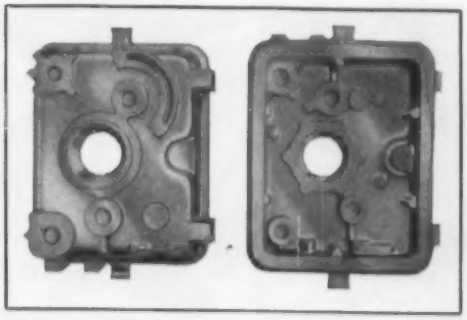
"WE REQUIRE THE BEST,"

says this user of OPC castings

Fenjohn Underwater Photo & Equipment Co. uses OPC #356 aluminum castings in the production of underwater cameras. "OPC castings are very clean . . . require less machine work . . . particularly pleased with lack of porosity, as the need for our equipment to go 200-250 feet underwater requires the best in this field." When *you* "require the best" in castings, check first with Ohio Precision Castings, Inc.

Fenjohn underwater cameras can withstand limited pressure, shock, heat, sterilization and flying debris.

The smooth finish and precise accuracy of this highly detailed OPC casting eliminates hours of costly machining time.



OPC

OHIO PRECISION CASTINGS, INC.

P. O. BOX 55—Station "A" • • • • DAYTON 3, OHIO

Plaster Mold Castings made from

BRASS • BRONZE • ALUMINUM • BERYLLIUM COPPER

ILLUSTRATED BROCHURE

Write NOW for your copy of new, illustrated brochure giving examples of on-the-job savings made possible with OPC castings.

ZINC AND ALUMINUM DIE CASTING
by NELSON METAL PRODUCTS, INC.

Example of a large Die Cast hinged assembly acceptable for chrome plated finish made possible by using our modern die casting machines and die making facilities

Wall box, zinc castings, size 11" x 14" x 5" deep.

Nelson metal products, inc.

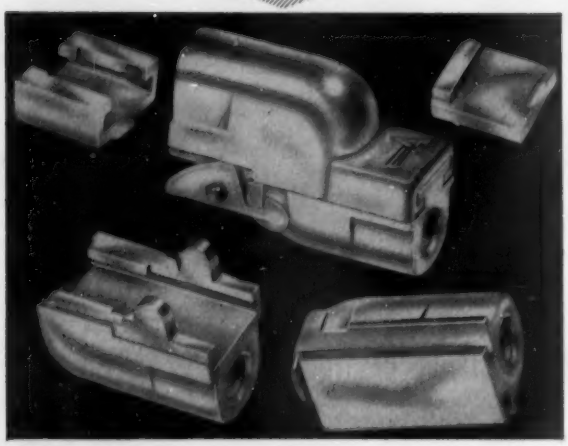
510 32nd St., S.E. GRAND RAPIDS 8, MICHIGAN

SALES OFFICES: GRAND RAPIDS • DETROIT

For additional information Circle No. 49 on the Reader Service Card

Aeroquip

SLIDE-SEAL COUPLINGS
Die Cast in Aluminum
By
LITEMETAL



The slide-seal coupling shown here, a product of Aeroquip Corporation, of Jackson, Michigan, has been proved by its many users and has obtained widespread acceptance.

To successfully die cast these couplings LITEMETAL experts developed special die construction permitting tolerances much closer than "standard." Besides the weight saving obtained through the use of aluminum, most important savings were effected in time and labor. Expensive or impossible broaching and milling operations were eliminated . . . machining time so minimized that it is actually reduced to simple drill press operations. These factors have put the product in a competitive selling position that could not be met by any other production method . . . another example of LITEMETAL engineering and die casting knowledge. In addition, the finishing operations for producing an attractive product have been reduced to an inexpensive tumbling process as the result of the smooth surfaces obtained through die casting.

Let's Talk It Over . . .

LITEMETAL DICAST, INC. is an organization of specialists — men thoroughly experienced in the casting and machining of magnesium and aluminum alloys. Our equipment includes big machines for big jobs — little machines for little jobs . . . the right sizes and types of the most modern die casting equipment for producing parts from the size of a button to large cable spools. Complete facilities for secondary operations are also available.

Write today for literature and design information. Quick action on inquiries.

LITEMETAL DICAST, Inc.
A DIVISION OF HAYES INDUSTRIES
1925 WILDWOOD AVE · JACKSON, MICHIGAN
PLANT AND EXECUTIVE OFFICES

For additional information Circle No. 39 on the Reader Service Card

J. W. HAFFNER ELECTED HEAD OF BUNKER HILL & SULLIVAN MINING

J. W. Haffner, vice president and general manager of Bunker Hill & Sullivan Mining & Concentrating Company, has been elected president of the company to succeed Stanley A. Easton who has retired.

At the company's annual meeting of stockholders March 29. Mr. Easton was elected chairman of the board. Addressing the meeting, Mr. Easton reported high metal inventories, described activities of the company-owned sulphuric acid plant, and commented on the effects of low prices for lead and zinc coupled with high operating costs.

1954 DIE CASTING PROGRAM
continued from page 36

ularly adjusted to reflect the metal markets — and since an uneconomic low means an inevitable upward movement, we know that we will face the unhappy task of making these adjustments when they occur.

In addition, the customer who invests in heavy die and tool charges, based upon a die

33 YEARS
"BETTER THAN EVER"

PEERLESS
STANDARDIZED PINIONS
and RACKS
FOR
DIE CASTING PERMANENT
PLASTIC MOLDS

Standard sizes of Peerless "Flame Hardened" Ejector Racks and Pinions are available for prompt shipment. Special sizes may be produced to your specifications.

We welcome your inquiries.

Peerless Gear & Machine Co.
320 N. WESTWOOD AVENUE
P.O. Box 317, Station "C"
TOLEDO 7, OHIO
Established 1921

For additional information Circle No. 58 on the Reader Service Card

casting quotation premised on uneconomic zinc prices, is bound to be psychologically unhappy when the die casting price is adjusted as zinc advances to a sound and economic level. And, gentlemen, all we as die casters have ever wanted from you is a stable, sound, economic level for special high grade slab.

Two points have been developed — one that confidence in zinc die castings has been shaken for all kinds of reasons — and second that no significant substitution of aluminum for zinc die castings has occurred.

These two circumstances were reviewed late in 1953 by the Joint Market Development Committee of the American Zinc Institute and American Die Casting Institute established in September 1953. This Committee, after study of the facts, developed a basic program for 1954 designed to restore confidence in zinc die castings and increase sales volume.

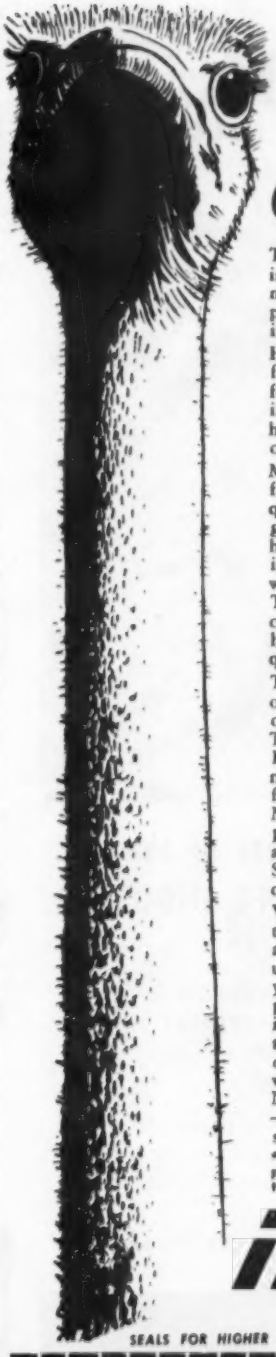
The program is premised on the evidence that the way to increase the sale of zinc die casting is to increase the total use of all die castings. This is to be developed through presenting examples of the inherent values of the die casting process.

Die casting represents the optimum of metal working processes. High speed production of close dimensioned, complex parts, produced to very close tolerance limits, with smooth finished surfaces and intricate coring, — with low labor content per piece — with the elimination of most subsequent machining operations — with excellent physical and mechanical properties — these are among the values. In fact die casting offers the user of metal fabrications so many plus values that more and more often those who know say 'How Else Could You Make It'.

And this, gentlemen, is the 1954 Die Casting Program:

1. **A moving picture produced and paid for by the American Zinc Institute called "How Else Could You Make It", stressing production sequences and examples of the highest attainment of the art of die casting—showing applications of all metals and types.**
2. **A booklet expanding the information in the film and placing die casting facts before the designer and engineer of our customer industries.**
3. **A publicity program in some 25 leading trade publications stressing the facts about zinc die casting applications.**
4. **The organizing and sponsoring of die casting exhibits by the American Die Casting Institute on a regional basis**

continued next page



Are you a Foundry Ostrich?

This stubborn bird hides his head in green sand every time someone mentions impregnation sealing of porous* castings. Doesn't believe in it!

He just won't look the facts in the face—even when those facts are that for hundreds of companies modern impregnation methods and materials have substantially licked the problem of porosity in pressure castings!

Many of these companies carry famous names—wouldn't endanger quality or reputations for all the gold at Fort Knox. So what's happened? Using the new impregnation methods and materials we've been able to develop at Tincher, they've cut rejects of castings to the lowest level in their history! And they haven't lowered quality by a hair's breadth!

This kind of experience points up one thing: Impregnation has "come of age"—quite largely because of Tincher research and development. For instance, right now we have new but thoroughly field-proven formulas for Tincher IMPREX Metallic Sealants that insure deep penetration and positive sealing. We also have a new IMPREX Plastic Sealant that permanently cures very coarse porosity—even "squirters".

We'd like you to make us *prove* that we can eliminate porous castings as a problem in your plant. Send us a sample batch of castings that you have found to be porous. We'll pay the shipping costs both ways—impregnate them and return them to you. *You test 'em, under your own conditions*—see for yourself whether we can do what we say. NO OLIGATION WHATSOEVER—but do it now! Send coupon for shipping instructions.

*Castings that must withstand liquid or air pressures and which have been rejected after tests as "leakers".

TINCHER IMPREX PROCESS

SEALS FOR HIGHER QUALITY, MORE PROFITABLE PRODUCTION

TINCHER PRODUCTS COMPANY, 819 Borden Ave., Sycamore, Illinois

Please send shipping instructions for my sample batch of castings consisting of _____ pieces. They weigh about _____ each and are _____ (give approx. dimensions) in size.

Name _____

Title _____

Company _____

Street _____

City _____ Zone _____ State _____

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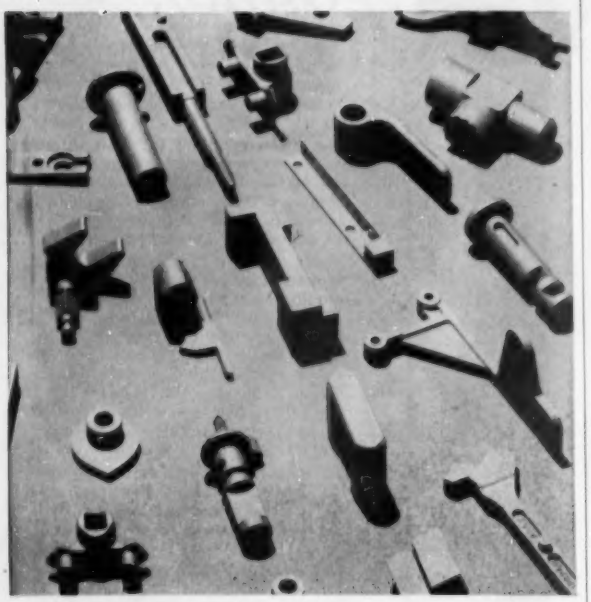
MASTERMET
CERTIFIED ALLOYS
for REMELT



meet the requirements of the
INVESTMENT CASTING INDUSTRY
INGOT - SHOT - BARS

Produced by **CANNON-MUSKEGON** for your particular application, **MASTERMET** Alloys match the needs of your melting operations. All variables are closely controlled.

Fast action on your orders is assured by our flexibility of operation, plus an inventory of frequently used alloys ready for immediate delivery.

Send today for the **MASTERMET** *Brochure*

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across the country with showings of the film.

5. The Sponsoring by the American Zinc Institute of special film presentations to trade, technical, and educational groups.
6. The forming of Speakers Bureaus in each of the four Regional Groups of the American Die Casting Institute to provide experienced die casting personnel for each showing of the film whether ADCI or AZI sponsored.
7. Advertising and publicity announcing the availability of such planned presentations of the film to group audiences.

In summary, a hard hitting, well organized program will place the facts about die castings before as large an audience as possible of users and potential users of die castings, by means of an all-out cooperative effort by the membership of the American Die Casting Institute and with the support and backing of the American Zinc Institute. This we are convinced will build die casting use to new high levels in all metals and reestablish the confidence of industry in the wider and expanded application of zinc die castings.

Always COMPARE!

EXCLUSIVE IMS ALL METAL SPRAY HEAD SPEEDS APPLICATIONS AND ONLY IMS OFFERS A FULLY BALANCED AND TESTED FORMULA

DELIVERED PRICES
Sample $2.00 Doz. $1.50 ea. Gross $1.37 ea.
(FURTHER DISCOUNTS ON LARGER ORDERS)

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GENUINE INJECTION MOLDERS SUPPLY COMPANY
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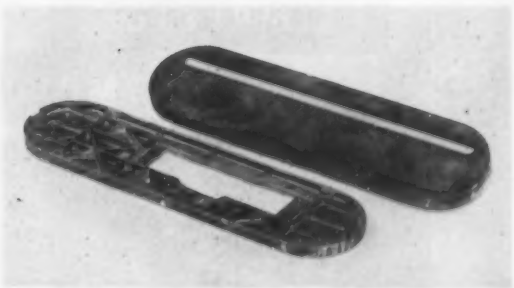
Simplified Solutions for product design problems

THIS COVER PLATE for a household oil burner must withstand surge pressures up to 300 psi. It was originally designed and made as a sand casting which required facing both sides and drilling all eight critically-located mounting holes. Rejects were numerous when the part was pressure tested. Converted to an aluminum permanent mold casting and produced by the EST Corp., drilling of holes has been eliminated, surfacing has been simplified so that both sides can be faced in a single operation, leakers have been virtually eliminated, and costs have been reduced.

FLATNESS and accuracy are major requirements of these castings for a table saw. As stampings, neither characteristic could be obtained and rigidity would suffer. Now they are die cast in aluminum alloy by Litemetal Dicast, Inc., and are accurate in overall length within a few thousandths and are stiffened by generous ribbing which prevents warping. Tooling cost for die casting dies is considerably less than for stamping dies to produce a comparable unit.



CAST A BEARING CAGE? Yes, this cage for roller bearings is investment cast in one piece in manganese bronze by The Investment Casting Co. The formed pocket on each vertical edge prevents rollers from skewing. Investment casting has produced a more rigid cage than previously possible, and results in longer service.

POWDERED IRON CORES
continued from page 52

Hydrogen Reduced Iron Powders. The reduction of iron oxides by hydrogen is not a new process, however, the early reduced iron powders were not suitable for the core industry. The George Mepham Co. a subsidiary of the C. K. Williams developed its I. R. N. powders which have been used as a standard by the industry since.

The main characteristics of hydrogen reduced iron powders are inherent softness, controlled particle size distribution, low carbon, sulphur and nitrogen contents, simple molding properties.

Magnetite. Magnetite is a magnetic natural iron oxide Fe_3O_4 which is mined and brought to a processing plant where it is ground to specified mesh size. It is the cheapest of all the basic materials for cores today, and owes its success to its low cost.

Electrolytic Iron Powders. One of the earliest methods used for the production of iron powder for use in magnetic cores was electrolytic in character. Ferrous sulphate was electrolyzed using mild steel anodes, the iron being deposited on cathodes of polished steel sheet. The resulting iron was brittle and readily broken down in suitable grinding equipment. This powder was used for loading coils and although it was later superseded by nickel-iron alloys, electrolytic iron is still in use today for certain other applications.

It must be pointed out, however, that various heat treatments and other processes are carried out before this powder is pressed into a core. Today, we find they play an important part in the iron core industry. The particle shape of electrolytic iron powder tends to be flaky. This can be an advantage if used properly and higher permeabilities and "Q" values in the lower frequencies can be obtained. A coarse

For additional information Circle No. 10 on the Reader Service Card

The Author:

JOHN C. WEBB attended the University of Missouri where he received a Rhoades Scholarship, and was graduated from the University of Oxford, England. He took graduate work at Columbia and New York Universities. He was vice president of Ferro-Cart Corp. of America, then sales manager of Maguirre Industries, and formed Magnetic Core Corp., of which he was president, in 1946.

POWDERED IRON CORES
continued from page 88

20 microns has been used at 20 kilocycles or less with a very high effective permeability. The electrolytic iron powder is of high purity, high permeability, (at frequencies one megacycle or less) and reasonable cost.

Carbonyl Iron Powder. Iron penta-carbonyl, which is liquid at room temperature, is decomposed by heating in an enclosure. Iron is deposited on the walls of the enclosure in the form of almost spherical particles of approximately five microns in diameter. This powder is of additional interest as it is an anomaly to the general conception of soft magnetic materials. While most of these are mechanically soft, the so called carbonyl iron is hard.

The characteristics of carbonyl iron powder are: small particle size, spherical shape, high purity, and the most stable material in use today.

Having outlined the types of magnetic powders let us turn to the stages of preparing them for fabrication. These types of insulation are used in the majority of mixes today.

Resinous or plastic where from ¼ of 1% to 3% resin is added to the powder and dissolved in a suitable solvent under some degree of heat, until the solvent evaporates. A polymer resin is then added, usually from 3 to 12 percent solids, mixed in with a suitable solvent until fairly dry, the powder is then granulated and separated as to particle size. This aids control of expansion, contraction and permeability.

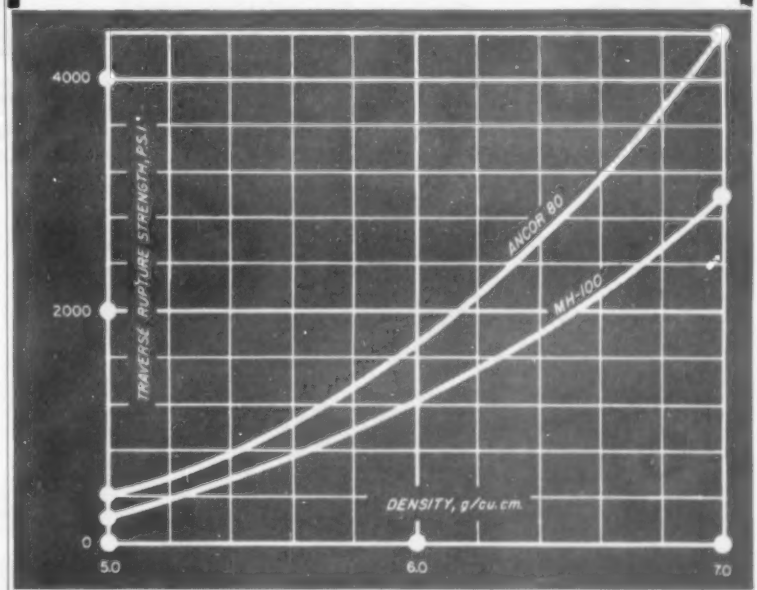
The other two types of insulating materials, namely ceramic and acid, are used in much the same procedure, as also are the bonding agents. A lubricant is then added and the powders are ready for pressing or extruding in some cases. Tools for powdered iron cores range from the very simple to complex. At times, press are used before the final ejection stroke.

Iron cores usually have a length to diameter ratio of 2 to 10, which complicates die design and construction. Carbide dies are practically a necessity. Chromium plated dies have been used in many cases where they have the advantage that worn plating can be stripped and new plating applied to bring the die back to its original dimensions. It is important that the plating be properly done, or the high ejection pressures will rapidly destroy the adherence of the chrome plate.

continued next page

HOEGANAES
Sponge Iron Powder

The increased green strength of the American produced Ancor 80 quality widens the range of parts that can be economically produced.



Green strength of Ancor 80 vs. our own MH/100 determined in accordance with MPA Standard 15-51T.

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For Design Consultation

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NEW YORK 17, NEW YORK

Sellers of Hoeganaes sponge iron powder.

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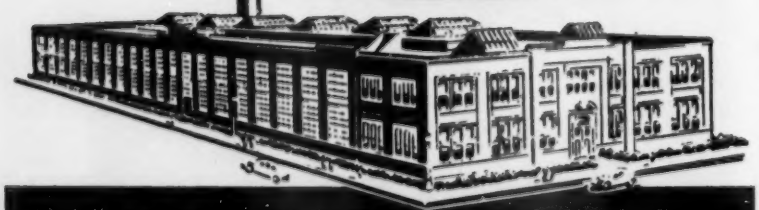

A COMPLETE DIE CASTING SERVICE ... FROM DESIGN TO FINISHED PRODUCT.

No matter what your die casting requirements may be, Central has the facilities, the equipment, the experience and trained personnel to produce castings to meet your rigid specifications.

Take advantage of Central's complete facilities and be assured of prompt economical service on the best castings made.

- Complete engineering and design service
- Die and tool making
- Most modern production equipment
- Research and quality control facilities
- Machining and finishing

May we help you with your production requirements.

Write today for prompt and practical assistance

CENTRAL Die Casting & Mfg. Co.

2935 W. 47th Street • Chicago 32, Illinois

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IRON CORES — cont.

Cores ¼" in diameter and smaller by 2 inches or more long can be pressed by using round punches and pressing with the long dimension perpendicular to the molding direction Die design and construction are of extreme importance in such an application. Sometimes it is better to hot mold and the press bed, powder shoe, and tools are heated to 90 to 125C.

The protective coating of cores after their manufacture is most important. These coatings can be applied by dipping, spraying or painting. Impregnation by immersing the cores in a coating solution, sealing the receptacle, and applying air pressure to force the solution into the surface pores of the material has been found the best method. On some materials it is necessary first to pickle the cores in a salt or acid bath to cut down the distributed capacitance or "skin effect".

The above procedures are most important as tests have shown that cores not properly protected can lose as much as 50 percent of their electrical qualities.

Today, we feel the iron core industry is just on the threshold of the door to progress. The past ten years have taught us many things and we eagerly await tomorrow.

TITANIUM ANALYSIS SECTION AT SAM TOUR

A Titanium Analysis Section has been created at Sam Tour & Co., Inc., 44 Trinity Place, New York 6, N. Y. Throughout nearly four years of work under research and development contracts from the Ordnance Corps, U. S. Army, the company has made extensive studies and carried out thousands of laboratory trials in finding and developing satisfactory methods for the chemical analysis of titanium metal and alloys.

Industry News

Companies · Plants · Associations

COST CUTTING BY INDUSTRY WILL INCREASE APPLICATIONS FOR ZINC DIE CASTINGS

Increased use by industry of zinc alloy die castings as a means of cutting product costs during the year 1954 has been predicted by Marshall L. Harvey, president of the American Zinc Institute.

The shift from a sellers to a buyers market has made 'designing for lower cost' the watchword in metalworking engineering departments of practically every company from coast to coast, Harvey said, regardless of whether they make consumer or industrial products.

"When engineers start to cut costs," he explained, "they begin first to streamline production operations wherever they can without sacrificing product quality. It is quite natural that they will now turn to production processes like die casting that can produce extremely accurate parts of almost limitless shapes with a minimum of machine operations," he stated.

"Zinc base alloy will be the material that will be selected for most of these die castings," Harvey reiterated, "because of its inherent high strength, ease of finishing with finishes like chromium plate and increased availability."

Some automobile companies, for example, avoided widespread specification of zinc die castings for a period until as recently as the 1954 models because of an unwarranted uncertainty about material supply, Havey explained, but right now they are giving zinc die castings major design consideration.

In 1953 about 296,000 tons of zinc went into die castings, he said, and predicted a great variety of applications in the present year. This is the industry that consumed only 13,000 tons of zinc a year in 1925. Today it is a $200-million-a-year industry and still growing.

California Die Caster Moves Into New Plant . . .

Union Die Casting Co., Ltd. has completed construction of a new die casting plant at 676 Putnam Drive, Whittier, Cal., and is scheduled to be installed in its new quarters by May 1st. The new plant gives the long-established die casting firm about 50,000 square feet of production area.

BUILD NEW PLANT FOR DIE CASTING

Construction has started in Gardena, California, on a factory and office building by the Die-Casting Division of the Martin-Ruegg Brass and Aluminum Foundry, according to an announcement by M. M. Kennedy, partner.

Custom molding and die casting for all types of industries will be done at the plant. The single story building will be concrete with composition roof supported by tapered girder beams. The five acre plant site allows for future expansion.

ROLLE EXPANDS PERMANENT MOLD FACILITIES

Considerable expansion of the permanent mold facilities of the Rolle Manufacturing Co., Lansdale, Pa. has been announced.

In addition to a major increase in plant area allocated to this phase of the company's operations, Rolle has acquired the services of European permanent mold and die cast-

For additional information Circle No. 9 on the Reader Service Card

for HOT CHAMBER DIE CASTING MACHINES

The AUTO-DIESEL TWO PIECE PLUNGER SEGMENT RINGS

The Auto-Diesel Two Piece Plunger Rings are designed for hot chamber die casting machines. They are QUALITY rings that are precision made to give you satisfactory service. Made of high grade wear resisting iron. Casting sizes available: — 1½", 2", 2¼", 2½", 2⅝", 2¾", 2⅞", 3", 3½", 3¾", 3⅞" 4" by ⅜". Write today for prices. We can make prompt delivery and they are attractively priced.

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ing authority. Recently arrived from Germany, he was formerly chief engineer, metallurgist, and designer for a major European manufacturer.

GARDEN SPRAY
continued from page 39

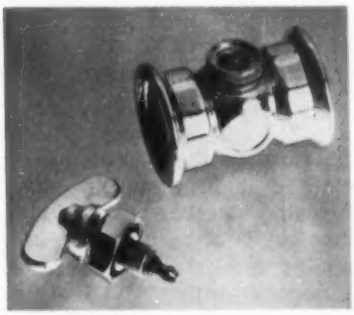
over the former molding costs and the threading operation has been eliminated. In addition, no gaskets are needed and the entire assembly operation has been eliminated. Actually, to achieve the same end product, the older structure require seven operations that are now eliminated.

While the new assembly has never been tested to destruction, it has, nevertheless, been subjected to pressures far in excess of any water pressures in the entire country without any indication of leakage or failure. It might be noted in passing, that when this sprayer was first manufactured some 18 years ago, the barrel was a brass tube fastened to brass connectors which were machined out of bar stock. Disregarding the bad feature of lack of visibility, such construction would be impossible today at the present costs for both labor and materials.

When the barrel section was redesigned, the balance of the sprayer was carefully examined for other possible cost reductions. The valve section of the sprayer was formerly machined from brass bar stoock. Not only was the brass expensive, but there was a considerable scrap loss and a large amount of labor involved. The body and the valve handle were, therefore, redesigned to be made as zinc die castings.

The redesigned valve is shown in Figure 3. On this part, there are now only three machining operations on the body. Standard hose threads are cut in each end, the bonnet is threaded to receive the pack-

ing nut and finally, the seat is cut and the threads for the stem are cut. All of these operations are simple and can be done rapidly. The valve handle is used as cast, except for plating of course, and the brass stem is knurled and pressed into a cored hole.



3. CHANGE FROM BRASS valve construction to die cast zinc has saved about 75 percent in manufacturing costs.

These changes resulted in a valve of considerably lower cost. An unanticipated improvement came through the use of a brass plug and zinc seat. In the older all brass valve, small bits of grit, rust, ets. tended to cut either the plug or the seat. To achieve a tight valve it was then necessary to either reseat the valve or scrap it and buy a new one. With the die cast body any small bits of foreign matter which might cut the seat are less injurious since the wiping action of the brass on the zinc tends to smooth out much of the minor damage that this foreign material does.

The changes that have been made by changing from brass to zinc die castings and then by redesigning some of the castings have resulted in a manufacturing cost reduction of between 75 and 90 per cent and have, in addition, given a spraying unit that is remarkably trouble free. In fact, the only cases where the users of the sprayer have had trouble have easily been traced to careless handling. All of the die castings used on the sprayer are made by Advance Pressure Castings, Inc. of Brooklyn, N. Y.

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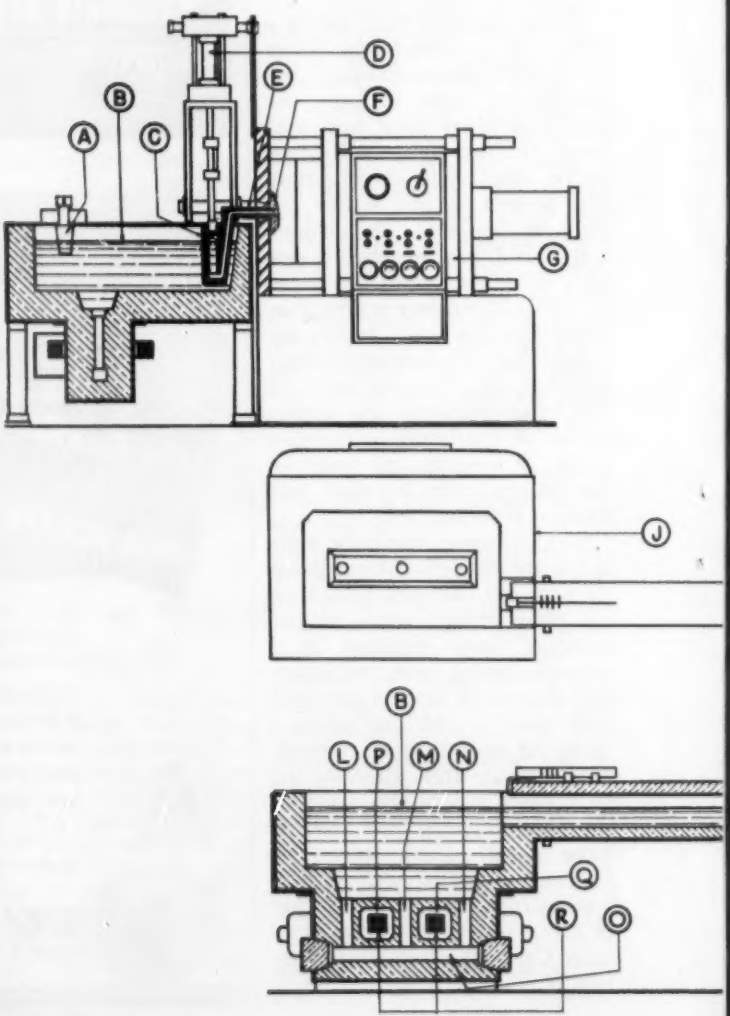
TECHNICAL REPORT

How To Reduce Zinc Losses In Die Casting

BY EDWARD W. BURD,
Metallurgical Engineer
Ajax Engineering Corp.

MARKED reduction in metal losses, reduction in casting defects, an improved method of alloying the zinc base die casting alloys and more efficient utilization has been accomplished in many sizeable die casting plants through the installation of all electric melting and holding furnaces together with supplementary equipment of the latest type.

Accomplishments in this di-



1. THREE GOOSENECK holding furnaces, representing a symmetrical grouping of six around a stationary, low frequency, induction melting furnace, are illustrated at right. Among the major elements identified are: (A) runners or launders connecting melting and holding furnaces; (B) common metal level; (C) immersed gooseneck; (E) nozzle; (I) low frequency, induction holding furnace; (J) low frequency, induction melting furnace; (K) insulated covers; (L,M,N,O) channels filled with molten metal forming short-circuited secondary for step-down transformer; (P, Q) primary coils; (R) laminated magnetic core.

rection result largely from the proper application of low frequency induction heating but they gain greatly by using a new method of alloying and by keeping the alloys substantially free from iron. This latter benefit is realized by virtual elimination of contact with iron surfaces. An additional favorable factor is avoidance of overheating of metal.

As a result of the new setup direct metal losses average about one-third of the losses formerly encountered. Virgin metal losses in the production of the zinc base aluminum alloys among the several companies using the new setup range from less than 1/10 to ¼ of one percent.

With prior equipment in one plant, rejects ran above 20 percent on certain castings to be plated and prolonged efforts to reduce this loss were not availing until the new equipment was installed. With the new equipment on the same castings and the same dies, rejects now run less than three percent.

Still further gains result because the castings need much less buffing and labor saving on this score is significant. An indirect saving due to the lower iron pickup is longer gooseneck life. As no iron pots are used in melting, holding and gooseneck operations, their first cost and replacement cost are cancelled.

Finally, zinc can be alloyed easily and uniformly in the induction furnace with much less labor and without any of the troubles commonly encountered in getting aluminum to dissolve in molten zinc. No casting of ingots to be remelted is necessary and, in the latest setups, the expense and hazards of distributing molten alloy in bull ladles to gooseneck holding furnaces are avoided because no ladling is required.

Before detailing the precise ways in which these savings are effected, a description of the layouts of the all-electric system for making zinc alloy, remelting gates, sprues, scrap, etc. and distributing it to the

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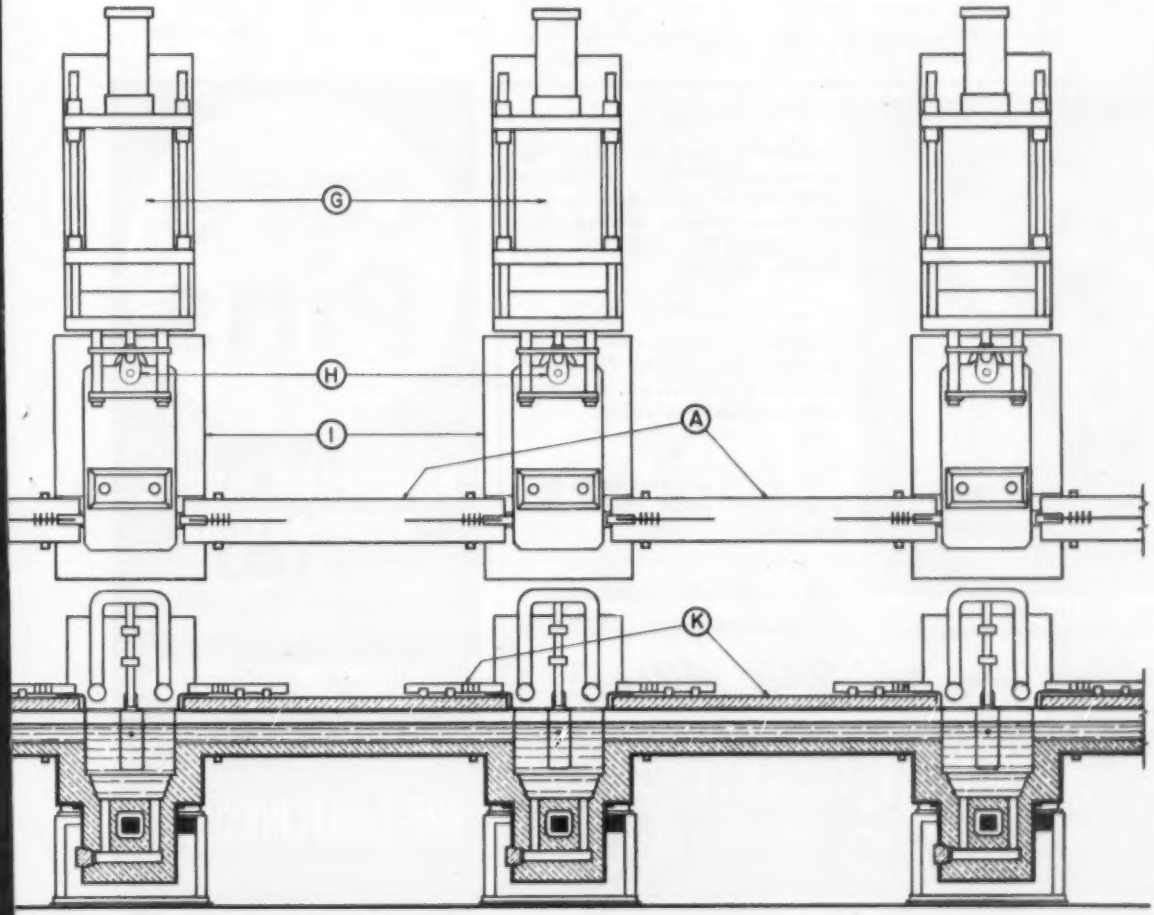

gooseneck holding furnaces at casting machines is in order. This system, illustrated in Figure 1, is applicable to any make of die casting machine of the common plunger type.

All melting is done, in this particular setup, in a fixed (as opposed to a tilting) or stationary Ajax-Tama-Wyatt low frequency induction furnace (J, Figure 1) made in capacities from 60 to 200 KW. Although this furnace can be used to melt pre-alloyed slabs of zinc if desired, it is commonly used to make the alloy by a very simple means described below.

Furnaces can be of a tilting type if distribution of the alloy to gooseneck holding furnaces is to be done by ladle but the better, safer and simpler setup employs heated runners (sometimes called "launders") to feed the metal to the gooseneck holding furnaces of the die casting machines.

In Figure 1, three gooseneck holding furnaces are shown constituting a symmetrical grouping of six gooseneck holding furnaces with the stationary melting furnace (J) located at the center. It is significant, however, that both the melting and gooseneck holding furnaces as well as the runners connecting them are lined with inert dielectric refractory having exceptionally long life and possessing good thermal insulating properties. Furnaces in use for zinc alloys a matter of several years have not been relined and the refractory is still in good condition. This refractory contains no iron and this effectively prevents the iron pickup that occurs when iron pots and gooseneck holding furnaces having large iron surfaces in contact with zinc alloy are used.

Benefits resulting from this freedom from iron pickup are real, yet they are sometimes overlooked by the die caster, perhaps because iron pickup has been considerd a necessary evil. Further particulars in this respect are given below.

Another objective is to keep oxidation and segregation of the zinc and the alloying aluminum at a minimum. This is attained by avoiding agitation (including the cascading that occurs when the molten alloy is poured into ladles and again when ladles are used to fill gooseneck holding furnaces) and by avoiding overheating of the metal. In the induction melting and holding procedure the heat is generated within the metal, no part of the furnace system is higher in temperature than the molten

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metal; consequently oxidation and skimming losses are almost eliminated. In the set-up, Figure 1, metal in the melting and gooseneck holding furnaces seeks its own common level (B) and this level varies only a small amount and quite slowly as metal is drawn off and replaced.

The runners or launders (A) are kept tightly covered and the metal therein is kept at the uniform optimum temperature by solid bar Nichrome resistance heaters supported just under the insulated covers (K). These resistors are thermostatically controlled and supply only enough heat to make up for radiation losses, which are small. Covers are easily removable and resistors can be replaced quickly if necessary but their life is long as they are out of contact with the zinc alloy and no splashing occurs.

Gooseneck holding furnaces are also of the Ajax low frequency induction type and are illustrated in Figure 1, represented by the low frequency induction holding furnace (I) with the immersed gooseneck (C) and the nozzle (E).

Another type of setup developed for smaller type die casting machines include a gooseneck that serves the same purposes as a conventional gooseneck but is much smaller and is of the latest "dry" design, Figure 2. This gooseneck is not immersed in the molten zinc alloy and holds only a small amount of molten zinc (three to four pounds) most of which is discharged through a heated nozzle at each shot of the die casting machine. Both the gooseneck casting and the nozzle are induction heated and consume only enough energy to keep the metal at desired casting temperature, usually 760 to 780 F.

In this new type of gooseneck, only a small amount of molten metal is in contact

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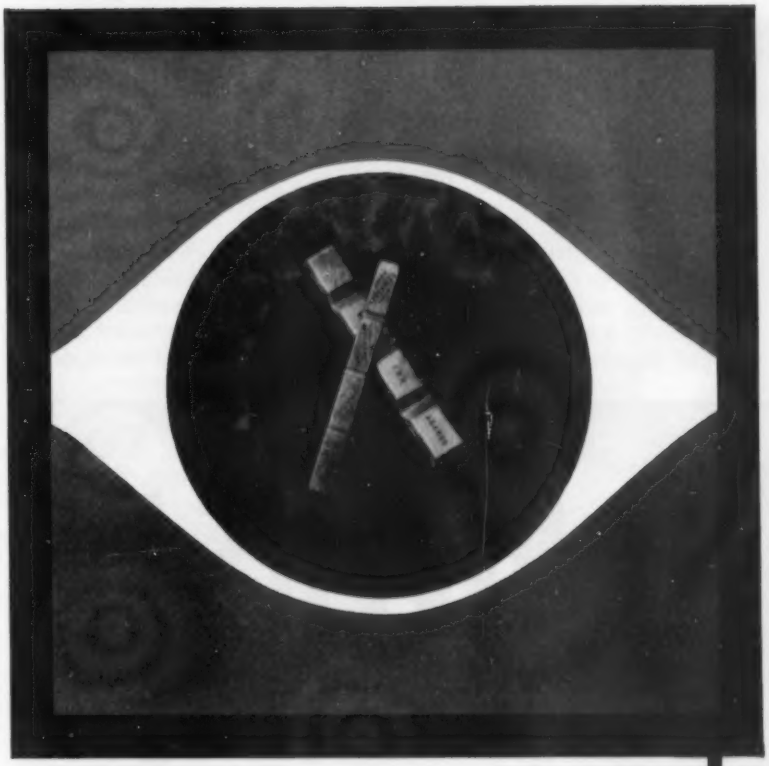

Let's look at the facts about die casting metals

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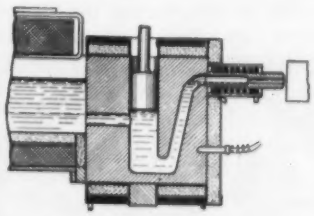
with iron walls and this metal remains there so short a time that iron pickup is negligible. Pickup is, of course, far less than that in conventional goosenecks which are not only much larger but are wet inside and outside with molten zinc alloy The dry gooseneck is connected with the holding furnace by a short heated runner or launder through which the metal flows to fill the gooseneck recess. One induction holding furnace may feed a number of "dry" goosenecks.

In the gooseneck casting, there is a cylinder in which a plunger operates in the conventional way. The significant differences are that iron pickup is virtually eliminated, that the life of the gooseneck is correspondingly increased and that temperature of the molten metal is precisely controlled without the uncertainties of using flame heating. Excellent castings are produced with molten metal at temperatures as low as 760 F.

Another important advantage of the setup shown in Figure 1 is that a relatively large mass of molten alloy remains in the system at all times. This tends to minimize variations both in composition and in temperature, especially at delivery points. There is never any over-heating because, with induction heating which is so easily and closely controlled, the heat is generated within the molten metal and does not have to pass through the walls of the iron pot.

It is generally conceded that detrimental results occur whenever zinc alloy is heated above an optimum temperature at which good castings can be made with a given die. It is generally accepted among zinc base die casting operators that the extent of iron contamination in the die casting alloy directly affects the fluidity of the metal. With increasing iron contamination, the alloy metal becomes considerably less fluid at normal operating temperatures.



DRY GOOSENECK design is illustrated by this section drawing.

The accumulation of surface scum indicates the depletion of aluminum from the alloy and the formation of iron-aluminum compounds which are inter-mixed with the products of surface oxidation. An increase in operating temperature will restore the fluidity but in-

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creases the speed of iron pickup. As the iron content increases, the alloy becomes more sluggish and must be hotter to fill the die. But raising the alloy temperature also increases its tendency to attack and dissolve iron.

Thus, the presence of iron, especially in percentages near or above upper specification limits, tends to create a condition constantly requiring higher and higher temperatures and at the same time increasing the rate at which iron is dissolved. This is one important reason why iron content needs to be minimized even though specifications permit 0.10 percent maximum. As this upper limit is approached, production of acceptable castings become more difficult, more rejects occur and castings accepted become harder to polish and to plate.

On the other hand, experience has shown that, if iron is kept to a trace. as it is in setups like that in Figure 1 and Figure 2, rejects are at a minimum and the work required in preparing castings for plating is materially decreased This has proved to be an important benefit, since the cost of such preparation is a significant item in over-all costs. It has required the development and extensive utilization of induction melting and the practical elimination of contacts between the zinc alloy and iron surfaces to create conditions in which the benefits of truly low iron contents could be learned and evaluated.

In conventional die casting setups, iron pickup starts in the iron melting pot and is rapid before alloying aluminum is added and dissolved. Presence of aluminum in solution tends to extract the iron with consequent loss of aluminum as skimmings, but the iron pickup continues as long as molten alloy remains in contact with iron pots and goosenecks. Some iron may be introduced with the aluminum hardener but the amount is

continued next page

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small if proper specifications are followed.

Conventional alloying is done in iron melting pots and considerable labor is involved in puddling or stirring whether solid aluminum shot is used or molten aluminum is added to the zinc charge. Often a portion of the zinc charge is heated to or near 1000 F to effect desired alloying and such heating increases iron pickup and drossing. Such procedures are accompanied by the formation of surface dross or metal loss. The use of the molten aluminum addition to the zinc charge requires a separate furnace, another operation and extra labor.

Such diffiiculties are avoided, metal losses are eliminated and the whole alloying procedure is simplified, made more uniform and rendered less costly when the alloying is done (by a patented method) in an induction melting furnace of proper design. The furnace can be either fixed or tilting but is fixed in a setup like that in Figure 1.

The furnace is essentially a step-down transformer having a short circuited secondary. The secondary is formed by the channels L, M, N, and O of Figure 1, which are filled with molten metal.

Normal line voltages and frequencies, usually 440 to 480 volts, single phase, 60 cycle, are supplied to the control cubicle. The control cubicle contains a bank of static capacitors for power factor correction, the necessary contactors for switching the furnace from high to low voltage for purposes of temperature control, a circuit breaker and auxiliary equipment needed to automatically control the power input to the furnace and thus maintain automatic temperature control.

The output voltage from the control cubicle is connected to the furnace coils by power cables. The coils P and Q are mounted on a laminated magnetic core R. The secondary channels L, M, N and O and the primary coils P and Q are seen to be mutually threaded by the magnetic core R. The secondary current is of heavy proportions and heat is generated in the molten metal filling these channels, according to the fundamental law that power equals I^2R. Electromagnetic forces cause the molten metal to circulate and heat is rapidly transferred throughout the molten metal system.

With this design of furnace and method of heating, alloying is done by the following means: Rectangular bars of aluminum hardener, usually about 3 ft. long and 1⅝ in. on a side, are purchased in cast form to the desired analysis. A conical recess is cored in one

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end of the cast bar to fit a mating projection on a steel bar by which the cast bar is placed into one of the vertical channels of the furnace.

The steel bar serves as a weighted guide and as the cast aluminum bar is dissolved in the vertical channel the steel bar is withdrawn. No iron pickup occurs from the steel bar because the operation is carried out at a temperature of 800 F and the steel bar does not project into the channel area. Melting and alloying are carried out at temperature of 800 F and there is no overheating of the metal either in the melting or gooseneck holding furnaces. The induced thermal circulation af the bath results in uniform alloying action between the molten zinc and the aluminum. The uniform composition of the alloy is inherent with the induction process.

With this setup, operation is continuous and melting can more than keep pace with metal consumption at the die casting machines. Actually, metal level varies little and no machines have to be stopped to await metal delivery by bull ladle. If the latter is preferred, however, a similar setup, minus the heated runners or launders for metal supply is adaptable.

LOOK AT SHELL MOLD
continued from page 45

primarily for the production of light metal ferrous alloys at Hamburg, Germany at the plant of Croning & Company. Recently the British claim patent rights for the process, but it is hardly likely that this claim will be recognized. Recent development work in this country has made this process a useful and economic tool suitable to the requirements of the foundry industry.

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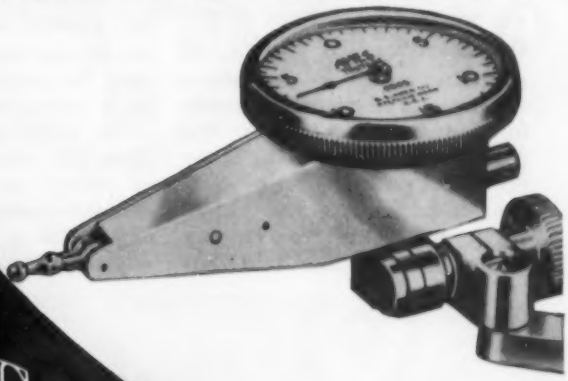
...to obtain cost reduction...



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Basically, the shell molding method makes use of the thermosetting properties of phenolic resins to provide a bond material for silica sands in the construction of the mold. The use of resins is by no means novel in the production of sand cores and molds. However shell molding methods are different in that neither water or other bonding materials are used.

The most suitable sands for the process are washed silica sands, the same as has been used for years in making dry sand cores and synthetic sands, ranging in fineness from 75 to 230 either of sub-angular or round grain shape. Clay content should be under 3% and the sand should be low in any metallic oxides or fluxing agents. As a general rule, the finer the sand, the smoother the surface. Zircon sands lend themselves to satisfactory performance, but their high cost make them impractical except for very special application. In our regular sand molding we use zircon sands for special die work and find the improved quality of the castings warrant the additional cost of the sand. Both silica and zircon flour in 10% additions make for improved surface finishes.

Sand producers are in many cases offering special sands for use in shell molding at somewhat higher prices than for the regular sands and in many instances it pays to use these special sands. The amount of resin employed will vary from 5 — 9 per cent by weight of the sand used. Resins in a number of different grades are available from a number of producers. The most satisfactory resins are those with low to moderate flowability, high melting point, and fast curing rates.

Resins are of the phenol-formaldehyde class, one step or two step type. Washed and dried sub-angular grain silica sand of 120 fineness is used with 90 parts of sand to 9 parts of the resin with 2% iron oxide added to prevent penetration and vaining. Mixing is done in the muller type mixing unit for 10 minutes.

Inasmuch as there is a difference in various resins, particularly as to flowability and melting point, it is necessary to experiment with the different types to decide which will give the best overall results.

Indications are that, before too long, precoated, resin-bonded sands will be on the market for producing shell molds. Precoating is accomplished with resins in liquid form, and it is intimated that less resin is employed than when dry material is employed. Segregation of resin also is said to be eliminated.

to be continued next month

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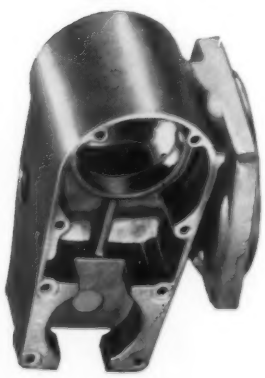

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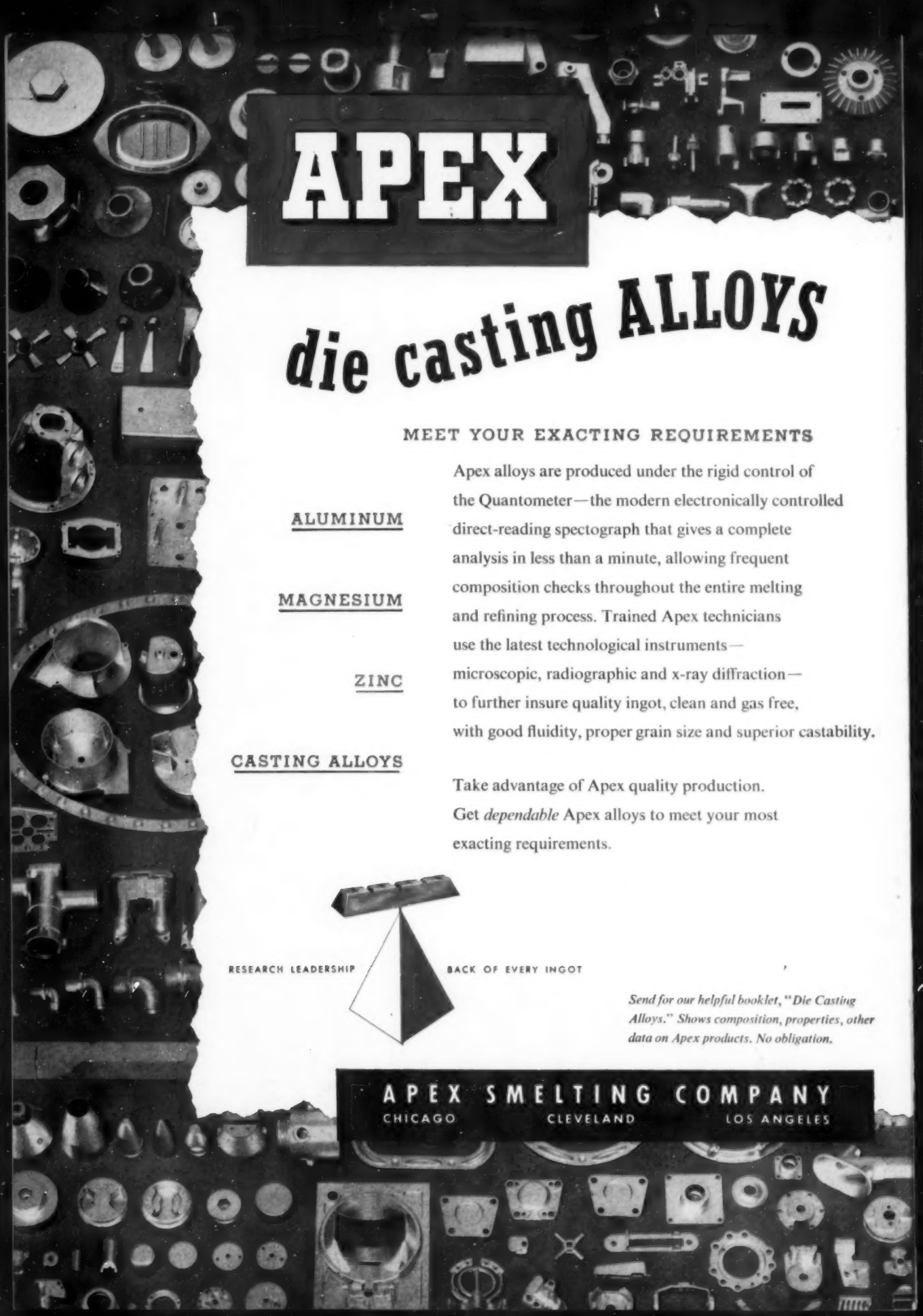
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